The Story of Thought and Feeling

F. Ryland.

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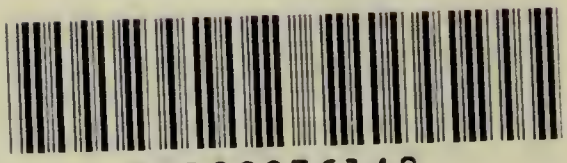
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The Story of Thought and Feeling

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The Story of Thought and Feeling

BY

FREDERICK RYLAND, M.A.

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PREFACE

THIS little book is intended to serve as an introduction to the study of some portions of the field of Psychology. It deals with the elementary phenomena of mental life in a more or less concrete and simple fashion, and avoids technicalities as much as possible; not entirely, however, because no clear notions can be obtained in any department of human knowledge without the use of at least a few technical terms. My chief object has been to give a clear outline, free from discussions on method and free from confusing detail.

The book was written before Professor Baldwin's volume in the present series *(The Story of the Mind)* was published. I may perhaps be permitted to recommend that work as a most valuable sequel to the present.

FREDERICK RYLAND.

PUTNEY.

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The Story of Thought and Feeling

CHAPTER I

THE STREAM OF CONSCIOUSNESS

As I walk down this suburban street, my mind is occupied by a series of "objects," to which I assign an existence apart from and external to myself. The road and the pavement, the red fronts of the houses, the trees in the garden, the butcher's cart, the children going to school, and the cloudy sky, I know to be somehow in my mind; they are (as I am at the present moment aware of them) ideas of my own. But I also know that, in a sense, they have a reality apart from myself, and that if I were to die or to drop unconscious on the pavement they would continue to exist as realities. What leads me to attribute to them an existence independent of my consciousness we shall have to consider later; for the present let us remember that these ideas are by psychologists called *percepts*, and the act of having such percepts is called *perception*. Under certain conditions I may have a long series of such percepts without interruption; the

mind passes from one to another without anything to divert it. Sometimes a part of the series is, so to speak, doubled on itself. As I follow with my eyes the figure of a friend on a bicycle, I turn my head and that part of the road through which I have passed recurs to me; the same houses appear again, but in the opposite order, and other changes in the percepts appear. I recognise them as essentially the same, however, in spite of minor changes. Less clearly—in the background, as it were, of my mind—I am occasionally aware of other percepts more peculiar to myself—the pressure of my clothes, the pressure of my boots on my feet, and of my feet on the pavement, the scent and flavour of my cigarette, perhaps a little headache. These less important percepts do not arouse much interest at the moment, but they are in some sense present, and could be brought into fuller consciousness if something called my attention to them.

In addition to these ideas of things actually present, or percepts, I am aware of ideas of a different character coming before my mind. I see a neighbour coming from his house, and I suddenly remember that last time I saw him I promised to lend him a book. Then an idea of a quite distinct type presents itself, brought into my consciousness by the percept of my neighbour. The name of the book and the appearance of the book are, in a way, present to me, so are the circumstances under which I made the promise, and the polite expressions of pleasure with which he acknowledged my offer. But if I cast one of

those side-glances which people call *introspective*, or if, within a short time, I recall the contents of my mind at this moment of recollection, I shall notice that these new ideas have a character in many ways distinct from the percepts which had previously occupied my attention. They are fainter, less full of detail, less impressive. I do not attribute to them the same immediate reality that I do to the percepts of the houses, the garden-fence, and my neighbour himself. They are more easily put aside. Unless I close my eyes I cannot shut out percepts entirely from my mind. If I am a careful mental observer, I am indeed aware that this affair of the book has somewhat thrust the other ideas, the percepts, into the background. But they will come back into full consciousness instantly if I let my eyes wander or my interest in the promise lapse. The objects of my percepts are here and now before me; the objects of these other ideas, my memories or images, are away from me. Under ordinary circumstances, then, memories or images are harder to keep in my mind than the others, as well as less vivid and clear; and I do not believe that they refer to things immediately present to me.

Let us suppose that my neighbour does not see me, and continues his walk in front of me as I go down the road. I suddenly see a carriage drive by, and I recognise a local medical man; this percept leads to a fresh train of memories; I recall that another neighbour has been seriously ill, and I wonder how he is; I think that I ought to have called or sent to know how he is.

I resolve to call on my way back. This leads to fresh memories. There are other things to be seen to on my way home, and—there I had nearly forgotten it—a telegram to despatch on my way to the station. Just then I hear a bell, and this percept, which derives all its impulsive force from the fact that I recognise it as the station-bell, rouses me effectually. All my small anxieties disappear, and I hurry forward in the hope of catching my train.

Let us stop here and consider the result of this little bit of introspective observation somewhat more closely. I notice that there has been a series of mental facts before me; and that the percepts and memories, although they differ, yet *form one series* more or less continuous. True, there has been constant change; but the changes have, as a rule, been gradual, one percept slowly passing into another, one image giving place without any appreciable gap to the next. Once or twice, indeed, there has been a more or less sudden intrusion. The railway bell, for instance, seemed to cut the series in two; a new set of images rushed upon me, I thought of the station, of the train running into it, of the fact that I really must not miss this train. But reflection, or as it is sometimes called, retrospection (which I must confirm by direct introspection when I get an opportunity) shows me that side by side with this great and sudden change in the principal series of memories certain other ideas persisted, namely those percepts of the road, the houses, the sky, and so on; as well as the less prominent percepts derived from the contact with my clothes, from

my cigarette, etc. They may have been all overlooked at the time, but they were there, and they helped to give the sense of continuity to the main stream. Whenever we observe the contents of our mind we shall find the same thing. There is always constant change going on in it; and there is yet a substantial sameness.

It is true that gaps do appear in it. When we wake up in the morning from a dreamless sleep and when we drop off into sleep at night, there is, no doubt, a breach. Some psychologists consider that there is always a small degree of consciousness present even in the deepest sleep; but for all practical purposes we may agree with Locke that the train of consciousness is sometimes broken, or, as he puts it, that "the mind thinks not always." The reader can test this for himself by taking laughing-gas. My own experience tells me that ordinarily, though not always, there is an absolute gap in time between the two trains of consciousness, before and after I have inhaled it; although of course there are a great many percepts common to the two. for instance, the dentist's room, the operator, and so on. The thoughtful reader may ask, What is it, then, that constitutes the link between the two? How is it that they are both *mine*, that the new train of percepts and images will have a practical identity with the old? This question is an extremely interesting one, but we must content ourselves for the present with merely noting the difficulty and leaving it unsolved.

Continuing to reflect on my train of consciousness, I notice further that the different percepts

and images did not all interest me to the same degree or in the same way. Some, as we saw, never took any real hold of my mind; such were the sensations due to my clothes. Others, for instance, the butcher's cart, got only a momentary glance; while yet others occupied all my attention. Such were the memory of my broken promise and the percept of the station-bell. Those that did attract my attention produced a special effect upon me, which we call *feeling* or *emotion*. When I remembered my broken promise I felt a little annoyed; when I heard the bell I felt anxious, and perhaps a little surprised. There seems reason to think that some degree of emotion accompanies all conscious trains, though the amount varies very much. If I ask myself what it is that distinguishes emotions from ideas, I may not be able to give a complete or satisfactory answer, but I see this, at any rate, that the feeling of annoyance was not a definite idea, which came into consciousness as a part of the series of ideas, taking its place between a preceding idea and a succeeding idea; that it was not like the ideas more or less precise in outline, so that I can give any clear account of its shape and contents; that it gave me an "all-overish" kind of consciousness, so that I seemed to be aware of it in my body and limbs, but not as a distinguishable percept, like the pinching of a boot or even the contact of my merino vest; and further, that it impelled me to action, for I remember that I made an impatient gesture with my hands and felt foolish for having done so.

These may not be sufficiently marked features

to distinguish emotion from ideas always and in every case; but they will serve our purpose for the present. We see that the feelings do not clearly form part of the train of consciousness; that is, they do not form items in it. But they, so to speak, soak into it and add colour to it; and under ordinary conditions, at any rate, it is not until some degree of emotion arises that we begin to act on an idea.

Attention.

We have in the present chapter several times employed the term *attention*. Every one knows what is meant by the word, so far that he can recognise the mental fact denoted by it. The external signs of attention are so well marked that there is seldom any difficulty in detecting it, or its opposite, in others. But in order to be somewhat more precise, let us consider the matter more closely.

Let us suppose that we are sitting in an easy-chair reading a not too interesting paragraph in a newspaper. A bell is heard, and does not rouse us; a servant opens the front door, and then we suddenly hear a strange voice, pitched in rather a loud tone. The servant replies in an agitated way; then there is a loud noise as of something upset. Our attention is at once fully aroused, and we listen with all our might. If any one could see us, he would notice that our eyes are set, our forehead is knitted, our head is held rigidly erect; we are sitting bolt upright, clutching the elbows of the chair, in which a

minute ago we were lolling listlessly. Simultaneously mental changes have occurred. Instead of the images feebly aroused by the newspaper paragraph, instead of the accompanying half-perceived sights and sounds of the sitting-room, the tones of the strange voice occupy the whole of our mind. Nearly everything else disappears. We do not notice that the cat has roused herself, that a big lump of coal has fallen on the hearth, that the clock has struck the half-hour. Any of these a few minutes ago would have obtained a place in our train of consciousness; but they are overlooked now. Our whole consciousness appears to be taken up by the unknown voice. As a matter of fact, this is not quite true; the other ideas have receded further into the background, but they have not entirely disappeared. Still they have lost most of their importance; and we see clearly that in attention our consciousness is *limited* in extent. This is one of the most familiar facts in life, yet there are people who are foolish enough to forget it. Parents and nurses stupidly scold children who are playing, reading, or even learning their lessons, because they do not notice what is going on in the room. The child who does notice everything that is going on in the room is not devoting its attention to the subject in hand; and is on the high road to mental feebleness and superficiality. A boy deep in his book cannot notice the condition of the fire, or the position of his grandmother's spectacles. The "bright" children, who notice everything, will be usually found incapable of effective attention to anything.

Further, it is seen that with attention our consciousness is *intensified*. The skin-irritation which passes unnoticed under ordinary circumstances becomes intolerable if we constantly direct attention to it; and so, too, the unpleasant tone of voice or the vulgar accent. It is well-known that during a battle the soldier often overlooks a wound. The other day I read of a bicycle accident in which a man who had received a large and dangerous wound, in the abdomen, walked for some miles without noticing it, and passed some time attending to his brother, who had met with merely a slight hurt. It was only after the doctor had examined his brother's trifling injuries that his own serious condition was noticed. Hypnotic experiments go to prove the same thing. If a patient's attention is fixed on some slight sensation, the sensation increases greatly in importance and presumably in intensity. The component tones of a chord are difficult to hear; but most musical amateurs can distinguish them after little practice by simply trying to attend to them. Some psychologists [1] have denied that ideas to which we attend increase in intensity; but this denial is not supported by facts. Of course the increase is strictly limited in amount. You cannot by attention increase the tick of a clock until it becomes as loud as that of an ore-crushing machine; but you can intensify it to some extent. At the same time the percept becomes more

[1] For instance Fechner and Münsterberg. The latter, however, admits that in the case of light sensation there is increase of intensity.

definite. This is exemplified in the case of the inner notes of the chord just spoken of; and other examples will be found in the acquired ability of the hunter to recognise marks of the passage of animals where the novice can see nothing, and in the power of the artist to see reflected colours on surfaces which to the ordinary eye show nothing but their own hue.

Another feature of attention, in fact its most characteristic one, is the *fixation* of the ideas to which we attend. The mind is naturally, as we have seen, in a state of change. There is a constant alteration in the ideas immediately before us, whether they are percepts or images Until special interest is aroused, we let them slip by without attempting to stop them. We remain, as it were, passive spectators of the procession. When an idea arouses interest, we, so to speak, put out our hand and detain it for a time. But the effort soon becomes difficult, and in a few seconds we find that our thoughts have wandered on—not very far, perhaps, but still away from the idea which arrested us. At first sight this seems absurd. It does not strike one as difficult to fix the mind for a considerable time on one subject; in fact, this is almost the first lesson we learn in "the conduct of the understanding." But though the same subject is before us, we constantly change our point of view. The mind hovers about it. The attention is rapidly transferred from one aspect to another. When I look at the inkstand before me, my full consciousness is given to the shape, the colour, the material, the blots on it, the amount of ink in it, and so on. There

is constant oscillation, although relatively to other objects the attention is fixed. Let the reader try this for himself, and he will be surprised at the changefulness of his mind. Under normal circumstances he does not retain exactly the same thought, whether percept or image, for more than a brief instant If the attention becomes quite fixed, one's consciousness gradually becomes not only less wide but less intense, and one either goes to sleep outright, or into that strange state of consciousness known as the hypnotic or mesmeric trance.

For the beginner in psychology there is no better way of studying the laws of attention than to place two different photographs, or a piece of print and a picture, in the two sides of a stereoscope—the old-fashioned box-shaped instrument is the best—and examine them closely. It is well known that the stereoscope, by the shape of the lenses, enables us to combine two very similar pictures, so that one overlaps the other, and the illusion of solidity is increased. If the pictures are quite different they will not, of course, be combined into a single picture ; but the two images will be thrown, so to speak, on the top of each other by the action of the lenses. This optical effect, however, does not produce a corresponding mental effect. We shall find that we do not confuse together the images, as might have been expected. Sometimes one prevails and sometimes the other ; while, at times, both are combined, but seldom in equal proportions. As a rule, the more forcible or interesting object will prevail, and the other disappear. Thus, if a face

with well-marked features, or a piece of print, is superposed on a blank space in the other picture, the face or the print is seen and not the blank space. But, at the same time, by fixing our attention on the feebler or less interesting object we can usually make it prevail over the other one. This shows us that two incompatible percepts cannot both occupy the focus of attention at once, and that merely physical or physiological causes do not of themselves determine which of two rival percepts shall prevail. It is obviously not merely a contest between the actual sensations of the two eyes By an effort we can get entirely rid of one of the images, and then the other looks as well defined as if both the pictures had been alike. It is attention that decides which of the two shall prevail. And attention is determined by its own laws. If a part or the whole of one of the objects has any special interest for us, by reason of greater strength of outline or otherwise, it will tend to get the upper hand. Again, that percept with which we are most familiar is more likely to be seen than the other. Again, if we form a more or less precise mental picture of one of the objects we shall probably see that one, while the picture which we do not anticipate seeing will not be seen.

It will be found that it is not enough to make up our mind to see with, say, the right eye only; but that we must make up our mind which *picture* we are going to see, we must preadjust our attention for one particular portrait if we are to see that and not the other. The same thing will be found true if we look at one and the same

object with spectacles having two differently coloured glasses. For percepts of sight, then, we establish by our experiments, (1) the existence of rivalry of ideas, (2) that intensity and interest in an object will, unless there is special attention to the other, cause the former to prevail in the struggle, (3) the fact that attention adds intensity and definiteness to the object attended to, (4) that it implies momentary loss of consciousness for other objects, (5) that attention has special conditions favourable to it, (6) that we attend most easily by forming an anticipation of what we want to perceive.

The same truths will be found to hold with regard to images or memories, as well as percepts; though we cannot use a stereoscope to prove it.

What we call consciousness may then exist in various degrees of intensity. In order to be recognised as consciousness at all, it must be in some degree concentrated. If we place a single lighted candle in the midst of a huge cavern it diffuses its light equally in all directions; and if we go even a hundred yards from it a certain amount of light will fall on the page of an open book, but so faint is the light that we cannot recognise it, and we say that the book is in darkness. But if we gather a large number of the rays by means of a great convex lens and make them converge on one point we shall be able to read by this focus of light. We shall, however, be able to see only a few letters at a time, and the rest of the page will be darker than before, because we have intercepted the rays that previ-

ously fell upon it. Something like this is the case with the mind. Even in the deepest sleep some degree of consciousness is perhaps present; when we are fully awake and are earnestly attending a very high degree of consciousness is present, but it is limited in extent. The total amount of consciousness at our disposal varies; and even at any moment, with a given amount, it may be variously distributed. If I sit watching the people in a crowd, my attention is fully aroused, but it is scattered over a wide area; directly I fix a man in the crowd whom I think I recognise, my consciousness is still further heightened but it is very much limited. For the instant I neglect everything but the one man; I do not see the buildings on the other side of the street, the rest of the crowd (except a few persons just near him), although the same physical stimuli are still making impressions on my brain. This alone shows us, we may remark, that the laws of mind are not really derivable from the laws of man's physical body, although they must be reconcilable with these latter, and be in a sense parallel with them. Subject to the fact that the total amount of consciousness varies from hour to hour, it is roughly true that the greater the intensity of consciousness the less the area. The more fully I attend to one given idea, the less I attend to all other ideas except those in immediate relation to that given idea.

Writers on the mechanism of sight make a distinction between what they call the *field* of vision and what they call the *point* of vision. We see with perfect clearness only the object directly

situated in the axis of the eye, the line which joins the centre of the pupil with the centre of the retina. Objects whose pictures fall nearer the circumference of the retina are seen with diminished clearness. Only experiment will convince the reader that this is true, because all our life we have been acquiring the art of disregarding this fact. For merely practical purposes it is best not to be aware of it; for scientific purposes, it is important to know it. We may borrow the terms to describe the phenomena of attention. The idea I am fully attending to is at the *point or focus of attention;* lying round it are other ideas, less distinct, which are in the *field of attention.* This must not be thought of as definitely marked off, but as passing into a region of still less intense consciousness, the region of *sub-consciousness.* Remember these terms are only metaphors. We know very well that there is no question of spaces or areas in the mind. But there are varieties of intensity; and in this intensity we note three well-marked grades which we have called (1) the point or focus of attention, (2) the field or marginal area of consciousness, and (3) the area of sub-consciousness.

There is, of course, a difference between the three cases. We know by direct introspection—that is, by direct observation—that (1) and (2) exist; but the existence of (3) is a matter of inference. What, then, are the reasons which have induced psychologists to accept the doctrine of the existence of states of consciousness which are not really conscious? And what do they mean by an idea which is only sub-conscious, an

idea which we cannot be directly aware of as an idea?

Sub-consciousness.

The hypothesis of the existence of unconscious or of sub-conscious ideas is adopted to explain certain facts of perception and memory. The percept of an object must be made up of a number of indistinct, faint impressions which produce no separate effect on the mind, but unite in producing a total effect in which the individual elements are indistinguishable. Thus my impression of a grass-plot must be made up of the impression of numberless green leaves, none of which I can distinguish as leaves. The noise of the waves on the beach must be made up of the noises of an almost infinite number of separate crashes and splashes, each of which produces some effect on my mind, though so faint that I cannot particularise it.

It may be argued that each infinitesimal effect is not really a mental fact at all, but a physical one; that it is a change in the nerves of hearing, unaccompanied by any change in the region of mind. But this view, though possibly true, is less probable than the other one; since in Nature continuity is the rule, sudden change the exception. It is much more likely that a very faint impression on the nerves and brain is accompanied by a very faint mental change, than that it is accompanied by no mental change. We know that after a certain degree of nervous stimulation has been reached consciousness appears. Thus if the muffin-man rings his bell all

down a long street as he approaches my house, I at first do not hear him, but at length the sound appears as an element in my consciousness. We may suppose either that this appearance is a sudden change with no kind of preparation, or that it is gradual, and that the consciousness gets more and more intense until it becomes aware of itself, passing from the stage of sub-consciousness to that of full consciousness. This latter seems the more probable explanation; in other words, the doctrine of sub-conscious mental modifications is more likely to be true than the doctrine of unconscious brain modifications.

And in the case of memory we often find one idea suggesting another idea through the mediation of a third idea which never really comes before us at all. The idea A suggests B, through the intermediate idea X, of which we are not actually aware, but whose existence we only afterwards infer. We are suddenly surprised by the arrival of an entirely incongruous thought, which seems to have no connection whatever with any other thought or percept now before our minds. On examination we trace the connecting idea X, and we can only suppose that X has been aroused somewhere in the outskirts of the vague marginal region of consciousness, but has never become sufficiently intense to attract attention. Readers will be able to supply examples from their own experience, but here is a well-known example given by Sir William Hamilton, the famous Edinburgh Professor of Logic and Metaphysics: "Thinking of Ben Lomond, this thought was immediately followed by the

thought of the Prussian system of education. Now, conceivable connection between these two ideas in themselves there was none. A little reflection, however, explained the anomaly. On my last visit to the mountain, I had met upon its summit a German gentleman, and though I had no consciousness of the intermediate and unawakened links between Ben Lomond and the Prussian schools, they were undoubtedly there—the German, Germany, Prussia—and, these media being admitted, the connection between the extremes was manifest." Hamilton points out the analogy between these psychological facts of association, and the passing onward of physical movement through a series of objects themselves unmoved. If a number of balls be suspended in a row by strings so that they just touch, and the first ball A be raised and allowed to fall on the next, the last ball B will fly off from its neighbour, the intermediate ones remaining still. This, of course, is only a rough mechanical illustration, and must by no means be taken as an explanation of *how* one idea may rouse another by means of intermediate ideas.

In the case of memory again it seems more likely that the intermediate links are really facts of mind and not merely facts of brain, changes in the mental sphere though not in the full sense of the term conscious. Continuity of operation is everywhere found in both the mental and the physical world, and it is more likely that the X which links A and B is an idea, (of course accompanied as all ideas are by a change in the cells and fibres of the brain,) than that it is a

change merely in the brain, without any degree of corresponding consciousness.

The existence of *sub-conscious ideas*, that is, of ideas with so little intensity that they do not actually appear in consciousness at all, is made more probable by the phenomena of forgetfulness. No sooner do we cease to attend to an idea than it begins to fade. If we have occasion to recall it within a short period there is little difficulty; but as time goes on the difficulty of recalling increases unless it has been revived in the interval. Thus I read of some event in this morning's paper, a member of the Government has influenza. If the name of this M.P. happens to be mentioned to-day, or this week, I shall recall the fact of his having influenza; in a month's time I shall hardly remember it. In a year's time, even if I were to meet him, I should be most unlikely to think of his attack. The complex idea, *Brown + influenza*, will have faded away into practical nothingness; but if anyone should mention the attack I may recollect hearing about it, so that it has not absolutely been destroyed. Some abnormal circumstance may revive a memory which has apparently long perished. In positions of great peril and in the delirium of fever men sometimes remember trivial incidents of their past life. The same thing is true of hypnotised people. Persons usually unable to recall events which happened to them before the age of seven, have, when hypnotised, been able to recall events which occurred at the age of three. Hypnotised patients also frequently remember ideas suggested to them in a previous hypnotic condition, which

in the normal condition between they do not remember.

The experiments of Beaunis, Gurney, Myers, Podmore and other recent workers in this field of research go far to establish the existence of sub-conscious ideas, which direct introspection makes probable. We may then provisionally assume that besides the focus of attention, and the marginal field of consciousness, there exists a vast territory of sub-consciousness, where the ideas are of such low intensity that they can not ordinarily be attended to at all. This sub-liminal consciousness (consciousness below the threshold) of which we know so little, plays a very important part in our mental life, particularly in perception, memory, and emotion. What we see, what we remember, and how we feel are to a large extent determined by facts which we must call mental, but which never come into clear consciousness. Just in the same way there are degrees of heat which we cannot even recognise as heat because they are so slight; so there are degrees of consciousness which we cannot recognise as such. Lord Kelvin puts the absolute zero point about 460° Fahrenheit below freezing point. No actual cold has ever been felt lower than about 90° Fahrenheit below freezing point. And it is needless to say that we should not recognise 90° Fahrenheit as a degree of *heat*, though in point of fact it is—being nearly 400° above absolute zero.

We have, then, to think of our stream of consciousness as something more than a simple flow of ideas, a stream running between well-built

banks. We must imagine it as varying much in depth and in breadth; sometimes reduced to a mere trickle and at other times a river in full flood submerging its ordinary borders. Before going to sleep the stream gets turned off into a thin trickle, and so it seems to be during the hypnotic trance; only one series of ideas seems to occupy the attention. Now the stream runs swiftly and now slowly; for sometimes the ideas succeed each other with startling rapidity, as in moments of excitement and strain, and at other times only dawdle along in slow viscous flow, like glue or treacle. Sometimes the stream appears to divide bodily for a time, or to forsake its old channel for a new one; for the consciousness may occasionally become, as it were, split into two parts, neither of which is in clear relation to the other—one part of my consciousness may be engaged in thinking thoughts which are unknown to the rest of my consciousness; and occasionally, too, the old consciousness seems to come to an end, and a new one to establish itself, knowing nothing of what has gone before.

Let us return to the subject of attention. We have seen that attention constantly varies in *intensity*, *extent*, *direction* and *fixation*; that as we walk along percepts and images lay hold of us with different degrees of violence, and pull us now this way and now that. We must not represent it to ourselves as a bull's-eye lantern turned now on one object and now on another; but as a lantern which is put out of focus and the light of which is turned down as it is transferred from one thing to another. It does not, to

change the metaphor, hop from one object to another. If we notice carefully what happens, we still see that attention is being focussed, then diffused, then focussed again on a fresh object. There is a kind of rhythm in this, a period of emphasis followed by a period of relaxation, and that again by a period of emphasis. We pass not only from ideas to ideas and percepts to percepts, but even from percepts to ideas without any perceptible jolt, and *vice versâ*. There are transitions, but during the transitions the attention is less vivid.

Inattention.

Inattention is as necessary to mental activity as attention. Morbid attention to a particular subject shows a tendency to insanity; we often speak of people being "mad on music" or "mad on politics." A perfectly healthy mind has special interests, but these are held in proper check by other interests, so that it is always possible for us not to attend to our hobby. With the majority of people the difficulty is to overcome the distractions of the world around us. The child learning his task on a summer morning in full sight of daisied meadows and inviting comrades, the weary barrister getting up his brief after dinner when he wants to be in the smoking-room, are examples. The cases differ, because the barrister has acquired greater ability in withdrawing his attention from the counter-attractions than the child, and has acquired greater interest in subjects originally uninterest-

ing. He can keep his mind fixed, because he reinforces the originally slight interest of his task by interests of an indirect kind. He remembers his fee, his reputation, his duty to his client, the special technical features of the case, and other sources of interest. These supply an artificial attractiveness to his labour. At the same time, not the strongest will can persevere against the combination of total lack of interest in the subject matter and considerable interest in the rival percepts and ideas. We can only make repeated efforts to exclude the latter, and let the subject matter have fair play, so that whatever power of stimulating attention it may have it can find time to develop. Under ordinary circumstances the constrained voluntary attention soon passes into automatic attention; the task becomes relatively interesting and the temptations to attend elsewhere less pressing. Voluntary attention properly so called is thus based on involuntary attention. The most self-controlled can at best only keep recalling the wandering thoughts, and thus leave the intrinsic interest of the subject to make itself felt. We help the process by using our limbs and fingers, by walking up and down the room, by "fidgeting" with objects in our reach (which stupid teachers are much too ready to regard as a serious crime) and by other ways of working off superabundant nervous energy. It has been suggested that in this way the nervous currents which are set up by the sights and sounds around us flow off at once without invading the higher centres of the brain, and thus disturbing the processes in the brain which are necessary to thought.

We attend only to those percepts which interest us. Most elementary percepts are interesting only in so far as they are signs which betoken the presence of other elementary percepts. Thus the comparative sizes of objects at different distances and the other features which help to make up what we call "perspective," are only interesting to most of us in so far as they indicate the actual size and distance of the object. Hence we pay no attention to them. Our observation passes over them and disregards the sign in order to dwell on that for which it stands. The patches of light or colour due to reflection we neglect in themselves, and think of them only as hinting at the nature of the surface. Only the artist notices these things; and he notices them because for him they have a value of their own. Ordinary folk do not remark the exact shape and size of the type employed by the printer; they pass at once from the sign to the thing signified. The proof-reader, however, does notice the type; because for him it is something more than a sign. This acquired capacity for inattention is of enormous value to us, by economising mental labour, as well as by diminishing the distractions that beset us. Thus we cease under ordinary conditions to attend to the irritation caused by our clothes, the sensations of heat and cold on the face, and the movements necessary to preserve a correct posture. We should not enjoy our novel if we read it as the proof-reader reads, with our attention arrested by every broken letter and every instance of bad spacing.

Whilst we are fully attending we are usually

aware of a *sensation of strain.* If we are watching a distant object or finding a place in a map, we feel this sensation in the eye and the forehead; if we are listening to a faint noise or trying to hear the separate tones of a chord, we feel it in the interior of the ears; if we wish to discriminate a flavour we feel it in the tongue. Thus in the case of external perception we refer the sensation of strain to the particular organ of sense employed. But when we are trying to recollect or to solve a problem, we seem to feel the strain in the interior of the head. This characteristic accompaniment of attention is doubtless due to actual physical changes in the parts where we locate the sensation. The amount of blood supplied to the brain and to the sense organ employed increases and the muscles of the latter become tense. This is how we come to be aware of the fact that we are attending.

Preadjustment.

In all complete attention there is expectation. When I am attending to a minute or distant object, I am trying to recognise it, and this means that I have hovering about the percept an image of that which I expect the percept to be. Attention implies an effort to understand, that is to link what we are attending to with previous knowledge (*apperception*). And this in turn implies anticipation of what the result of the process will be. We shall have further illustration of this when we come to treat of the perception of external objects; here it is only

necessary to say that complete attention implies *pre-adjustment* of the sense organs and of the mental machinery to the task. When a stimulus suddenly makes itself felt, before adjustment can take place, our perception is baulked and is slower than it otherwise would be in coming to maturity.

In some cases this delay gives rise to a painful shock of surprise. Everyone knows the unpleasant feeling which accompanies a sudden and unexpected noise, a false step at the bottom of a staircase, the sudden failure of an anticipation even if the anticipation is not entirely pleasant. Imperfect adjustment always brings pain, because it involves the strain of attempting to adjust properly. Let the reader note what happens when he suddenly hears some strange sound in the middle of the night. He is bound to attend to it; the novelty and comparative loudness of it are sufficient to ensure that. But he cannot attend to it properly because he does not know what to listen for. The room is in utter darkness, and he tries to locate the sound by slowly turning his head. At first he cannot tell whether it is a loudish sound originating at some distance, like steady creaking of an obstinate cupboard door in the next room slowly forced open, or a quiet soft sound in his own room close to him. In this state of uncertainty he cannot even attend to it with any precision, much less arrive at any clear judgment about it. Experiments go to show that when pre-adjustment is perfect the impression enters the focus of attention without any appreciable delay, even if not particularly intense;

whereas in all other cases a certain appreciable amount of time is taken. If the image we form be inadequate, or inappropriate—for instance, if we expect a sound and receive a sensation of a flash of light, or expect a low sound and hear a loud one—it interferes with the act of perception, because of the imperfect adjustment. When we have a clear image of what we are going to see we shall see it more quickly and more clearly than if we do not know what we are going to see. In certain circumstances, when the adjustment is very accurate we may actually perceive the impression before it occurs. What I mean is this. Suppose a number of events happen in the order A, B, C, D, and I fix my attention on C, expecting it intently, that is, forming a very clear image of it, I may actually appear to see C before B instead of after. Thus, according to Fechner, the patient who is going to be bled sometimes sees the blood flow (C) before he sees the lancet enter the skin (B). The explanation is evidently this. The patient's attention is fixed mainly on the appearance of the blood; it is this which chiefly interests him, it is easily pictured, and for this the adjustment is perfect; but he is not so interested in, nor so capable of foreseeing, the movement of the lancet. Hence the latter (B) requires a comparatively long time for its complete perception, while the former (C) enters the focus of attention the very instant it occurs.

CHAPTER II

MENTAL IMAGES

If I look at an incandescent electric light for a quarter or a third of a second and rapidly turn my eyes away or close them, I see either immediately or after a few seconds a bright image of the glowing looped thread, which I had hardly been able to distinguish when my eyes were actually fixed on the vacuum-bulb. This bright image is projected forward; I can see it on the opposite wall or on the ceiling, and it bears considerable resemblance to a percept. It impresses me as being real and not as being a mere idea, a mere mental fact; like a percept it cannot be voluntarily changed in character; like the percept of a speck in the lens of my eye it moves as I move my head or eyes. On the other hand it is a mere flat diagram, little more than an outline, without suggestion of solidity. Such an image is called by psychologists a *positive after-image*. If the exposure has been longer, or the light very intense, it very rapidly disappears and in its place appears a *negative after-image*, in which the outline is dark and the ground lighter. Everybody knows the dark spot which he sees on the road after looking at the unclouded sun. Alternation of colours may go on for some time. Let the reader try it for himself by looking at the bars of a venetian blind against a clear sky, or by looking at a strong light, for instance the setting sun. He will find that by rubbing his eyes, a dying after-image may be revived. In

my own case after looking at the sun through a mist, and then shutting the eyes, I see in succession :— First, a small light dot against the red background of the eyelids; this gets distorted owing to movements of the eyes, and appears as an elongated spot with a lighter centre; then I see a green spot with darker green or blue border against the red background, other spots make their appearance, but less well defined; if I put my hands over my eyes and darken the bright crimson background made by my eyelids, a red border appears round the green spot, now somewhat duller; and, finally, if at any time I open my eyes and look at a white sheet of paper the spot, now red, is seen projected against the paper. This case of the sun is more complex than the others, since here the colour of the after-image is affected by contrast with the brilliant red of the background. White positive after-images seen against a *dark* background pass through green, blue, violet and rose-red, before they fade.[1]

We see, then, in after-images a transitional form between a percept and a true mental image. Closely allied with them, if not indeed special forms of them, are the *recurrent sensations* (or *recurrent percepts*) observed by workers with the microscope. A long while after his work is finished an observer will sometimes see projected on a blank surface, or in the dark, an image of the object at which he has been looking. The

[1] There is reason to think that some difference among individuals exists as to the degrees of vividness and persistence of after-images.

late Lord Tennyson related how, after trying to read a Persian manuscript written in a small, confusing hand, he saw "the Persian letters like giants stalking round the room." Here, again, we have what is after all more a percept than a mental image, properly so-called; it is regarded as located outside the body, on the ceiling or wall at which we are looking. Persistent after-images help to explain the sight of ghosts, devils, and so forth. It has been shown that if we go to sleep after looking at an object (putting out the light and shutting our eyes at the same instant so as to prevent a fresh vision arising), and if directly we awake in the morning we look up at the white ceiling over our head, we may, on again closing our eyes, perceive a long-delayed after-image of the object. After-images seem to be constantly occurring to our marginal consciousness. We overlook them under ordinary circumstances; but in abnormal conditions of mind they may give rise to hallucinations.

Visualization.

The true *memory-image* is recognised at once as a mental fact and not as a physical one. If I picture an object, say, a friend's face, in my own mind, it is seen not as a flat diagram but as in relief, with the effect of solidity and perspective. I can dismiss it when I choose and substitute another; it does not follow the movements of my eyes and head, nor is it projected on a surface in front of me if I open my eyes. If we look at an object, say a

stranger's face, for a few seconds, and then close the eyes, the memory-image we get is particularly bright and clear, but it soon fades. This is the *primary memory-image*. Later on it will be only possible to get an ordinary memory-image much less definite and vivid. At each successive repetition the original is more blurred, and with many people after a few hours it becomes impossible to accurately revive the image of a stranger's face.

Persons differ enormously in their power of visualizing. In consequence of a famous inquiry made by Mr. Francis Galton in 1880, he discovered that "the great majority of men of science to whom I first applied protested that mental imagery was unknown to them, and they looked on me as fanciful and fantastic in supposing that the words 'mental imagery' really expressed what I believed everybody supposed them to mean." He found this inability not confined to scientific men; it occurs even with artists. Royal Academicians are sometimes without the capacity of visualization; and I myself know of one R.A. who, if he paints without a "model," makes a clay statue or portion of a statue and then paints from that, apparently because his tactual and motor memory is so much better than his visual one. To quote Mr. Galton again:— "When I spoke to persons whom I met in general society, I found an entirely different disposition to prevail. Many men, and a yet larger number of women, and many boys and girls, declare that they habitually saw mental imagery, and that it was perfectly distinct to them and full of colour.

I have many cases of persons mentally reading off scores when playing the pianoforte, or manuscript when they are making speeches."

We must not think that imagination is necessarily visual. There is, for instance, such a thing as auditory imagination, the re-hearing by the mental ear of tones and other sounds. The musician can recall a tune distinctly and completely, in the tones of any voice or instrument he chooses. The unmusical recall it imperfectly and indistinctly, if at all. Let someone play or sing a new melody to three or four persons, and let them each try to sing it or hum it after an interval of a few minutes, and again in a few hours, of course, not in hearing of each other. The different degrees of accuracy with which it will be remembered are surprising, and it may be found that persons with considerable musical taste and executive skill may be markedly deficient in musical imagination. We find, too, phenomena in the case of hearing, which correspond to visual after-images. After a gun has gone off near us, or a locomotive engine has uttered its intolerable whistle, we have a ringing in the ears which seems to be clearly an after-image. So also we experience auditory phenomena answering to the primary memory-image of sight. After we have heard a clock strike, or a door-knocker sound, we have for some seconds a very vivid image of the sound, so that we can count the strokes (up to seven or eight) even if we failed to do so when the sound actually reached our ears. Parallel, though not equally distinct, phenomena can be noticed in the case of touch, taste, and other sensations.

Constructive Imagination.

All imagination is in its essence reproductive. When we speak of an imaginative person, however, we usually mean a person who does not merely visualize clearly, but one who combines his images in new ways, not in strict accordance with actual fact. This is natural enough, but a little misleading. It is not the want of regard for fact, the originality, of the novelist or poet which makes him imaginative; the two characteristics may or may not exist together. Defoe was less original than many a writer of fairy-stories, but he was infinitely more imaginative than most of them. He saw things as they must actually have occurred to Crusoe. With all its details complete he saw the cave, and its shelves, and furniture, the osier baskets and pottery vessels, he knew where the corn and powder were kept, and so forth. And note that this power of constructing clear and definite mental pictures out of elements already acquired by experience is not confined to the artistic mind. Imagination, creative as well as reproductive, is often necessary to the man of science, and the man of affairs. Just think how a physiologist gets to know the behaviour of an interior organ, say the heart; he cannot see it working, even the Röntgen rays have not enabled him to do that. From what he has seen in dissection, and from what he has seen in the behaviour of the valves of pumps, he puts together a mental picture of how the heart must behave when actually at work in the living body. Unless this

power exists he never really *knows* how the heart acts, though he may have a great many particulars at his finger-ends; he has only a verbal memory of truths about the heart's action, instead of a direct knowledge of the action itself. The same thing is true, though in a less degree, of the practical man, who has to picture exactly how the people he has to deal with will act on the receipt of a certain letter. In the purely abstract sciences, such as mathematics, imagination is of less importance; and in following trains of reasoning the tendency to visualize becomes a positive hindrance. It is impossible, for instance, to think out economical problems concerning the value of commodities—*e.g.*, the effect produced on prices by the introduction of a bimetallic currency—if we keep picturing to ourselves sovereigns and shillings, and people buying and selling. Galton, as we have seen, found that the majority of men of science whom he first questioned seemed to be ignorant almost of the existence of the power of mental imagery.

The Child's Imagination.

When children first begin to notice the images in their minds they often fail to distinguish between images and percepts. A vivid image tends to be regarded as an actual fact of the external world. In my own childhood I certainly never completely disentangled certain fancies and dreams from my waking experience. A child I knew, aged five or six years, believed that on the top of a certain wardrobe in the nursery lived

a malignant being about a foot high, which occasionally looked over at him; and that bears lived in the chimney. He never seriously asked his elders about these matters, partly because he was afraid of being laughed at, and partly because he believed that they practised a system of hypocritical reserve, just as they did about some other subjects of interest, and that their denials about bogies and ghosts were never to be taken quite literally. This belief of his was not persistent; it went away and came back from time to time until he was seven or eight years old, reinforced possibly by dreams. All children's play has nearly always an element of imagination. The doll is not the same thing to the child who is playing with it as to the elder who is looking on. It comes "trailing clouds of glory" which are invisible to us but are as real to the child as any fact of perception. The ugliest travesty of the human form, legless and armless, divested of hair and of complexion, if wrapped in bright-coloured rags, becomes a princess, as readily as the newest and most modish waxen model.

Some starting-point is generally needed, but what the starting-point is matters very little. It connects the world of fancy with the world of sense; since it can at least be touched and felt. It occupies space, can be laid down and taken up again. So the fancies borrow a degree of reality which otherwise they would not possess. The same thing is found to be true of the illusions of hypnotized persons. It is necessary to give them something to look at or touch as a nucleus for their imagination, but what it is is comparatively

unimportant. A rolling-pin in the hands of the patient becomes a baby or a snake or a gun; a blank card serves as a photograph of a landscape or of a person. From watching my own little girls I am fully persuaded that up to the age of about thirteen they sometimes during the holidays lived a detached life of considerable completeness for days together with their dolls, all of whom had distinct personalities and histories of their own; and that this isolated life was not much less vivid (between the intervals of meals and walks) than the life which we call real. This imaginary existence was continuous; what the dolls learned on one day was supposed to be remembered on the next, they had their likes and dislikes, their illnesses and recoveries, their fits of temper and their moments of good behaviour. Many charming accounts of the force of childish imagination will be found in Professor Sully's "Studies of Childhood," a book which all sensible people who have to deal with children should read. Dr. Sully points out how "through the perfect gift of visual realisation which a child brings to it the verbal narrative becomes a record of fact, a true history." Hence children strongly resent any variation in the telling of the stories; they keep the details in their minds because they picture them all; and any change strikes them as an outrage because it is in palpable conflict with what they so clearly apprehend as here and now present. "Woe to the unfortunate mother who in telling one of the good stock nursery tales varies a detail. One such, a friend of mine, repeating 'Puss in

Boots' inadvertently made the hero sit on a chair instead of on a box to pull on his boots. She was greeted by a sharp volley of 'No's!' The same lady tells me that when narrating the story of 'Beauty and the Beast' for the second time only, she forgot in describing the effect of the Beast's sighing to add after the words 'till the glasses on the table shake,' and 'the candles are nearly blown out'; whereupon the serene little listeners at once stopped the narrator and supplied the interesting detail." (Sully.)

Imagination and Memory.

Let us now consider the difference between a memory or recollection, and an image. If the reader conjures up first an image of a table he has never seen—an imaginary table, and then the image of his own dining-table, he will notice that the former differs from the latter in two ways. To begin with it is less full of detail and probably less clear and vivid; and then it is cut off from other ideas, and he does not pass easily from the picture of the table to the picture of the surrounding circumstances, the carpet, the chairs, the walls, etc. In the one case we are aware of the image of the table as part of a larger whole, with which we can easily connect it; in the other we are aware of it only as an isolated thing, for although we can if we choose add fresh surroundings to it, we do not think of them as originally forming part of a whole to which the table actually belonged. But there is a more important difference; there is a particular kind of

feeling about the recollection or memory; it feels familiar, and on reflection we see that it belongs to our own past. We cannot always locate it exactly in our own past, but we feel sure that it has a proper place in that portion of "the dark backward and abysm" of time which we call ours. In fact, such a reminiscence as that of the table may be regarded as the image of a table *plus* the recognition of it as representing a part of our own experience. There is a reference to the past and my *own* past. This is probably due to the revival of something more than the image itself, viz., a fringe of partially represented images of other connected things. Round the clearly represented table, lying in what we call the field of attention or else in the sub-conscious region, are faintly represented images of my chairs, carpet, bookcases, and myself entering the room. This brings about what we call *recognition*, which in itself seems to be rather a kind of emotion or feeling than a kind of knowledge, a feeling of "warmth and intimacy," as Professor James calls it. A mere image does not involve belief, a reminiscence or recollection does. And belief is essentially a mode of feeling.

Defects of Memory.

Faults of memory are of several types. We may be lacking in retentive power, so that things soon fade; but until they do fade they may be easily recalled. We may, on the other hand, be fairly retentive, but the power of recall may be slow and uncertain. We are all familiar with

the man who, if we give him time, can remember almost anything, but whose knowledge is seldom entirely available at the moment. Both of these are defects of memory, or, as they are termed, *amnesias*. Amnesia may be total or partial. After a severe blow on the head total forgetfulness of the past may follow. Such total forgetfulness may also, it would seem, occur in cases of lunacy, and under hypnotism. But partial amnesia is much more common. In some cases there is forgetfulness of an entire group or class of ideas. Perhaps the most important is the case of forgetfulness of speech (*aphasia*) which in a marked form is usually the symptom of very serious mental disease. Medical men have carefully distinguished different sub-divisions of aphasia; such as *ataxic aphasia*, in which there is loss of the power of uttering words and writing, though the patient can understand spoken or written language; *sensorial aphasia*, in which there is loss of power to understand spoken or written language; *paraphasia*, in which while words are remembered they are not connected with their proper meanings, and so on. Sometimes a single class of words only is forgotten, for instance all those beginning with the letter B.

These are all examples of defect of retentive power. A much less usual defect is that of excessive memory (*hypermnesia*). This is usually only temporary and often precedes outbursts of mental disease. It is found both in persons of very low and very high mental capacity. Dr. Forbes Winslow has recorded the case of a man "who could remember the day when every

person had been buried in the parish for thirty-five years, and could repeat with unvarying accuracy the name and age of the deceased and the mourners at the funeral." But the man was "a complete fool. Out of the line of funerals he had not one idea, could not give an intelligible reply to a single question, nor be trusted even to feed himself." An idiot at Earlswood "showed evidence of being the possessor of a memory which was almost encyclopedic." On the other hand, Porson, the great Greek scholar, could repeat by heart pages and chapters which he had read only once. Joseph Scaliger, the great sixteenth century classical scholar, in three weeks committed to memory the whole of Homer. Macaulay could say by heart any part of his works.

During the hypnotic and other abnormal states, and during delirium, a great exaltation of memory occasionally occurs. A living physiological professor (Luys) relates that a young lady who attended one of his lectures repeated it several months afterwards, when in a state of somnambulism, though in the normal condition she was unable to repeat a word of it, and asserted that she had not listened to it, and did not in the least understand it. This is very similar to a well-known incident related by Coleridge in the *Biographia Literaria*, as having happened in Germany shortly before his arrival at Göttingen (1799). Dr. Rush, an American writer on mental disease, relates on the authority of a Lutheran pastor in Philadelphia that the old Swedes who inhabited one part of the city, would

upon their death-beds pray in the Swedish language, although they had not spoken it for fifty or sixty years, and had probably in their ordinary condition quite forgotten it.

Inability to recall is much more common than inability to recognise. Recent experimental researches (Binet and Henri) go to show that the errors from the former cause are sixteen or seventeen times more numerous, when the test is applied a few minutes after the ideas have been committed to memory; doubtless the proportion greatly diminishes afterwards. A more moderate estimate (E. A. Kirkpatrick) gives the proportion as only two to one. Inability to recognise a perfectly clear percept which we have previously had is, however, quite common, especially in regard to sounds. Persons with some musical skill and taste will often fail, after a short interval, to recognise a tune they have previously heard; and among those with less than the average musical ear no shame is felt in owning the inability. It is said that a great authority in the Moral Sciences is unable to recognise any tune except *God save the Queen* and *Dulce Domum*, and these two he does not know apart. So, too, images of the past which ought to be recognised as belonging to our own experience often pass into the condition of mere images. This happens frequently in the healthy mind, and is, in fact, a condition of complete knowledge. Who remembers when he first learnt that William the Conqueror landed in 1066, or that twelve twelves are one hundred and forty-four? But it occurs in a striking form in the insane. In some cases of

mental disease, according to Griesinger, the events of the past are recalled, but the patient is scarcely able to recognise them as having happened to himself. For him they remain images which hardly attain the position of recollections. False recognition, that is, recognition where there is no ground for it, because the experience is in point of fact new, is now called by psychologists *paramnesia*. Here we have the acceptance of a new percept as in reality being identical with an old image. It is usually rather an alarming phenomenon, being sometimes accompanied with great confusion, and a keen feeling of dread approaching terror, though at other times producing little emotional disturbance.

The phenomenon in its milder form is familiar to most of us. To take an example from a recent French writer on the subject: "C—— relates that at his *vivâ voce* examination in history for his bachelor's degree, it appeared to him that he had already heard the same questions propounded by the same professor, speaking in the same room, and in the same voice. His own answer, it seemed to him, had been already uttered; he himself once more listened to himself speaking. Everything appeared to have already happened before." Here is a more remarkable case recorded in the year 1876. Dr. Pick reported that a well-educated young man was attacked at the age of thirty-two with this illusory memory, now called paramnesia. "If he was present at a social gathering, if he visited any place whatever, if he met a stranger, the incident, with all the attendant circumstances, appeared so familiar

that he was convinced of having received the same impression before, of having been surrounded by the same persons or the same objects, under the same sky, and the same state of the weather. If he undertook any new occupation, he seemed to have gone through with it at some previous time and under the same condition." In this case the mental affection became almost chronic, and the unfortunate young man became insane. This is a well-defined, but fairly typical, case. Both Dickens and Oliver Wendell Holmes refer to this feeling of "having seen all this before." The more alarming type is described in the following account, quoted by M. Lalande: "Whilst reading a novel in the train, I was suddenly seized with the idea that I had already read it, and at the same instant there arose in my mind such a whirlwind of memories and images that I thought I was going mad. That endured for five minutes, during which I suffered horribly." No satisfactory explanation of the phenomenon has yet been found. The theory that it is due to independent action of the two halves of the brain may be at once dismissed. It is hardly more satisfactory than the crazy notion that we have "pre-existed," and that our present life is a more or less exact repetition of a preceding one, a belief which finds its most illustrious exponent in Mr. Chucks, the ship's carpenter in *Peter Simple*. It is possible that the actual recognition of a portion of what we see leads to the belief that the whole scene has been witnessed before; a partial recognition is exaggerated into a total one. Some-

thing gives rise to the "feeling of warmth and intimacy," and the feeling overflows and tinges the whole complex percept, so that we appear to recognise every item, instead of a very small part of the total.

Memory is relatively stronger in young people than in old, especially the memory for merely casual and non-rational connections. Probably our memory is at its best between the ages of thirteen and twenty-five, after that the power to retain and the power to recall show some enfeeblement in reference to purely arbitrary connections. The link between a man and his name is an instance of such a merely arbitrary connection, and the memory for people's names begins to diminish in early manhood. It is common for people between thirty and forty to become nervously anxious about their failing mental powers owing to this. But it seems that enfeeblement of memory in relation to such purely casual connections is quite compatible not only with a higher development of judgment and reasoning, but with a higher development of memory itself in other directions. The doctor who forgets the names of patients may have a most retentive memory for their symptoms. It is probably due to a tendency to economize our mental efforts that we pay slight attention to what has little real significance. The name does not help us to judge the circumstances of the case, to estimate the nature of the symptoms, to infer the character of the individual; so we give it but slight attention. Later we pay the penalty of this slight attention

by forgetting the name. The child and the woman of the world have much more interest in names, and they remember them better. Adults up to middle age are on the whole superior to children in the power of voluntary recollection, that is, of recalling what they want to recall; while children are at least equally strong in involuntary memory.

There are not only degrees of memory but different kinds of memory. It has been found that persons differ much in the kind of images which form the principal stock-in-trade of their minds. Some habitually retain and revive visual images; others auditory ones, that is, images of sound; others motor ones, that is, images of movement; others tactile, that is, images derived from touch. Any of them may form the main part of our memories. Of course the blind must do without the first; and the deaf without the second. But there seems, from recent experimental research by Münsterberg and others, to be a decided advantage in trusting to visual memory. Thus in one series of experiments it was found that the errors made in the case of visual memory were 20 per cent. of the total attempts, while in auditory memory they were over 30 per cent.; that is, a person was half as likely again to remember when he trusted to the eye alone as when he trusted to the ear alone.

Conditions of Recollection.

So far we have considered the nature of images and what distinguishes memory from mere

imagination. Let us now look for a moment at the conditions which determine recollection. It is impossible to consider separately all the different types, and as psychology in the abstract is about as interesting as that "love in the abstract" which the Scotsman wanted to talk about, let us confine ourselves to the case of the memory of names. How do we revive the memory of words? Setting aside the case in which a word has just been seen or heard, where a kind of after-image or primary memory image survives in the field of attention, and confining ourselves to cases of true revival, we notice the following points:—

Firstly, the name sometimes rises of itself without any connection that we can detect, just as a tune sometimes does; it rises straight out of the dim regions of sub-consciousness, where it has been resting (or so it seems) for an opportunity to rise once more above the threshold of consciousness. When we are interested in any particular subject, our minds go back to it as soon as room is made. Business worries which are banished during the social meal are apt to come back over the uninteresting book or during the solitary walk, *à propos* of nothing at all, simply because there are no rival ideas present of so much interest to us. It is something like the case of the two photographs already mentioned; where a blank space is shown in (say) the right-hand one, features of the left-hand photograph shine through.

Secondly, the name revives in consequence of

having been originally heard or seen in close connection with other words, sounds, or things—let us say percepts in general—which are now again present. Then when I see a man I normally and naturally think of his name. This is called by psychologists *suggestion* (or *association*) *by contiguity.*

Thirdly, names appear to revive in consequence of similarity in sound or spelling to other words in consciousness, or in consequence of their similarity of meaning. Thus, I see the name Roland, and I immediately think of my own name. Here we have what is called *suggestion* (or *association*) *by similarity.* It is very doubtful whether mere likeness ever acts in entire independence of contiguity; but if we remember this, we may allow that similarity may have an important share in bringing about revival.

Fourthly, names are revived more easily when they have been frequently repeated. Experiments made in the last few years confirm the great value put on repetition by teachers, etc.

Fifthly, attention to the thing to be remembered is necessary as well as repetition; the boy who merely repeats a word or phrase many times without attending to it gains comparatively little by it. It is better remembered if he attends fully to it once for all and does not repeat. The dismal attempts most children make at learning by heart are due to neglect of attention. The excuse, "I spent half an hour over it," or "I went over it six times," is only too familiar to most teachers.

Sixthly, names are remembered more easily by

some persons than others. The original "adhesiveness" as Dr. Bain calls it, that is, the natural power of retention, the nature of the subject-matter, the age of the person, all these influence the power to recollect. But on these points enough has been already said.

Seventhly, names recently heard are more likely to be remembered than others. The lapse of time counts for a great deal. Where there is no repetition and no fresh application of attention to the name it gradually fades, like all other ideas.

Eighthly, names are remembered because we *try* to revive them. Voluntary recollection may recall what would not otherwise come back to us. We fix our attention, as it were, on the vacant space where the word ought to be, and wait. But while this direction of attention is very important, it does not act independently of itself. When I try to remember the author of a book of which I remember the title, I fix my attention on the appearance of the book, I try to remember how the lettering on the back looks, or the title page. Part of the image is before me, and I wait for the rest to come. What my voluntary attention does is to exclude rival images which would distract me, and to increase the clearness and vividness of the image. Attention is absolutely necessary; association is of no use without it, misleading us more easily than helping us, for it revives other images rather than the image we want. Indeed if we do not attend at all, association ceases to act and we fall asleep. If the name of the author of the book

does not come at once, various other names are sure to suggest themselves. These are usually somewhat like the name we want, or in some way connected with it. As a rule they begin with the same letter. Thus, for years when I wanted to remember the editor of the great *Dictionary of English and American Authors* I always thought of Appleton before I thought of the right name—Allibone; Appleton being the name of the publisher of another well-known American work of reference, which I frequently had occasion to consult at the same time that I was consulting Allibone. Each wrong suggestion is rejected (if our power of recognition is good) and we wait again, acutely conscious of what Professor James calls "the aching void" that we want to fill. Sometimes there seems to be an actual prohibition laid on the particular name we want. It cannot rise though it tries to. To put it more accurately, there is not merely negative failure to remember, but positive incapacity to remember. Other words come up but this one cannot. Hypnotic experiments show that such a state of things does occur. If a hypnotized person is told that he cannot remember a certain word he cannot. However clearly it is suggested, he fails to revive it. This is parallel to the inability of such patients to see or touch or in any way perceive the presence of objects which they are told they cannot see. We all know that the belief that we cannot find an object, or perform an act, very often prevents us from doing so. So it may be here in trying to remember the name. The thing cannot be

done because we believe it cannot. The inability is only made worse by our struggles; and our one hope is to let the matter drop. Attention having been diverted from the "aching void," the mental machinery of recall begins to work of itself, and in time the name turns up without effort. It has been hovering just below the threshold of consciousness all the time, and now that the paralysing suggestion of inability has disappeared, it comes into the full light of consciousness.

In all this active remembrance we can do no more than give the links of association already formed the chance of acting. If no associations have been formed, we cannot supply their place. Hence the supreme importance of attending to things that we want to remember, detaining them in consciousness, noting their relations to other things, concentrating our thought on them. Thus Binet and Henri, two French psychologists, found on careful experiment that foreign words were more easily remembered than native; and they reasonably attribute this difference to the additional attention bestowed on such words.

CHAPTER III

PERCEPTION AND ILLUSION

If we ask ourselves how we come to perceive things around us, the natural answer is to say, that the things affect our organs of sense in such

a way that we somehow come to have in our minds images of them. Let us suppose that we are looking at a glass inkstand. The plain man's account of the matter would probably be something like this :—There is an actual material inkstand there on the table, which would exist in exactly the same way whether we looked at it or not; when we see it, it produces changes in our eyes owing to the rays of light which proceed from it; these effects on our eyes are transferred to the brain by means of the nerves of the eyes, and then we necessarily see the inkstand, just as it is.

This account differs in many ways from the truth. In the first place it assumes that what we call the cause of the percept, viz., the inkstand, is in qualities the same as the percept itself, or to put the matter in another way, that the mental fact we call a percept is a kind of copy of an external fact we call a material thing. In the next place it assumes that so far as perception is concerned the whole work of the mind is simply to receive; as John Locke, the great seventeenth century psychologist puts it, "in bare naked perception the mind is, for the most part, only passive, and what it perceives it cannot help perceiving." Modern psychology on the other hand has shown decisively, without leaving any room for a shadow of doubt, that our percepts are not in any sense copies of external realities, somehow thrown on to the mind, as (let us say) an image is thrown on to the film of a camera; but that they are elaborate compound states of consciousness put together by the mind from

materials long ago accumulated. A percept of an inkstand is not a single new idea, but a group of ideas, nearly all of which are old ones. Consequently several persons with different mental histories looking at an object do not obtain exactly the same percept, for they have not the same stock of ideas to draw upon. Granted that in normal individuals there must be something in common, yet the percepts they have on the presentation of the same object will differ in a notable degree. To justify and illustrate this statement, which is surely as striking as any discovery made in the physical sciences during the last two centuries is our chief business in the present chapter.

Let us imagine ourselves taking an afternoon walk along a straight country road which gives us an uninterrupted view of several miles. As we go along we see something we have not noticed before. Against the yellow white surface almost on a level with our eyes, which we believe is the prolongation of the road, we see a grayish patch of no very clear form. A moment or two afterwards we think that it is the postman's cart from X. The patch of colour which at present we cannot discriminate is obviously moving, whether towards us or away from us we cannot immediately tell. That will take a minute or two of careful watching to decide. But without hesitation we jump to the conclusion, That is the postman's cart from X. Why? If something called us away and made us terminate our walk at this point, we should unhesitatingly say (perhaps after consulting our

watch) that we had seen the postman's cart. Yet how much have we actually *seen?* How much represents mere sensations, and how much represents additional features which we have added to the sensation?

The *time* at which the event occurs has, it is clear, greatly helped to decide us; if the gray patch had appeared three hours earlier or three hours later we should have said, That cannot be the postman's cart from X. Thus our supposed sight of the cart coming towards us turns out to be an inference from the fact that the postman always comes along the road in the afternoon in the opposite direction to that in which we are walking, and at a certain time usually reaches a certain place near where we seem to see the gray patch. Our percept turns out to have in it a large element of inference, or guessing, and on the apprehension of that moving gray patch we fly to a conclusion, which if challenged appears, to say the least, a very daring one. The patch is so small that, if I try, I can cover it with the point of my cedar pencil, just the protruding lead, held at arm's length; and yet I believe it to be an object which measures five or six feet in total width. It is gray, and the cart with which I identify it is red, while the horse is black. It creeps along very slowly, and I believe it is moving at the rate of seven or eight miles an hour. In form it is markedly unlike the form of an actual horse and cart. Yet I feel a good deal of certainty in my decision, and if on continuing my walk I were to discover that my gray patch were a cow or a

four-wheeled waggon; or that it were moving in the same direction as myself instead of meeting me; or even if I found that it were not the postman's cart but some other two-wheeled cart, I should feel a decided shock of surprise. On the basis of a very small amount of directly received sensation, I have built up a large structure of guess-work; and yet unless a psychologist's habit of introspection had laid hold of me, I should never have felt any suspicion of the true state of the case.

All Perception Involves Inference.

Yes, the reader may perhaps say, that is all very well; but you have taken a peculiar and unusual case. Here the element of direct sensation is very small and uncertain; we acknowledge that, and supply the plea by guessing. But how about an object in the same room? Do psychologists mean to say that we only *infer* the presence of the apple on the plate, of the wine in the decanter, of the flowers in the vases on the table here before us?

> "Are things what they seem,
> Or is visions about?"

The psychologist replies, The two cases are essentially similar, though, of course, they differ in detail. Look at the apple. You are quite certain that it is an apple. Why? Because you know that under the conditions existing it is much more likely to be an apple than a wax-imitation of an apple, or one of those ingenious

cakes of scented soap which imitate the appearance of an apple so well. On your table after dinner you expect apples, and a momentary apprehension of green and red colour and a roundish shape convinces you that the apple is there. But you know you may be mistaken. If it were the 1st of April and your son and heir were at home, it is possible that now I start the doubt you might not sweep it away so easily. The appearance is normal, and there is nothing to rouse suspicion, so you do not hesitate, but at once lay hold of the fruit. Suppose that the weight were rather greater or rather less than you expect, would not your doubt return? Or if the apple felt a little colder or a little warmer?

The possibility of mistake shows us that what we call perception is not a simple process of receiving into the mind complete, ready-made ideas, but a process by which we arrive at a highly complex idea by using knowledge previously obtained. Ordinarily, no doubt, the whole thing takes place so easily and so quickly that the steps by which the result is arrived at cannot be detected; but, all the same, perception is never a simple reception of an impression made on the mind. It is never the registration of a mere bundle of sensations, imprinted on a blank film, but a process of essentially the same kind as inference or thought.

The point is so important that we may be permitted to dwell on it a little longer. Let us first quote a passage from John Stuart Mill which will help to make the matter clearer:

"I affirm that I hear a man's voice. This would pass, in common language, for a direct perception. All, however, which is really perception [Mill means all that is immediately given me by sensation] is that I hear a sound. That the sound is a voice, and that voice the voice of a man, are not perceptions but inferences. I affirm, again, that I saw my brother at a certain hour this morning. If any proposition concerning a matter of fact would commonly be said to be known by the direct testimony of the senses, this surely would be so. The truth, however, is far otherwise. I only saw a certain coloured surface; or rather I had the kind of visual sensations which are usually produced by a coloured surface; and from these as marks, known to be such by previous experience, I concluded that I saw my brother. I might have had sensations precisely similar, when my brother was not there. I might have seen some other person so nearly resembling him in appearance, as, at the distance, and with the degree of attention which I bestowed, to be mistaken for him. I might have been asleep, and have dreamed that I saw him; or in a state of nervous disorder, which brought his image before me in a waking hallucination. In all these modes, many have been led to believe that they saw persons well known to them who were dead or far distant. If any of these suppositions had been true, the affirmation that I saw my brother would have been erroneous."[1]

[1] Mill, *Logic*, Book IV., ch. I., § 2.

Illusions of Perception.

In this passage Mill mentions the case of illusions, which throw much light on the subject. An illusion is a false percept, the basis of which can be assigned. If from a given object of experience I get a percept which is different from that which a normal person would get under the most favourable circumstances for getting a true percept, there is illusion. Thus when the conjurer makes me apparently see him break up my watch by a blow of a hammer and then reproduces the watch unharmed, I know that if a person of perfectly clear sight and full power of attention had been placed in the most favourable possible position for seeing, he would not see what I see (or appear to see) but something else. In all cases of illusion there is a misinterpretation of some of the data which, under ordinary circumstances, might give rise to valid percepts.

There is a well-known passage in Sir Walter Scott's *Letters on Demonology and Witchcraft* which relates how he saw an apparition of Lord Byron at Abbotsford. Scott had been reading an account of his lately deceased friend. He laid down the book, and, passing into the hall, saw by the rays of the moon "right before him and in a standing posture, the exact representation of his departed friend, whose recollection had been so strongly brought to his imagination. He stopped for a single moment, so as to notice the wonderful accuracy with which fancy had impressed upon the bodily eye the peculiarities of dress and posture of the illustrious poet. Sensible, how-

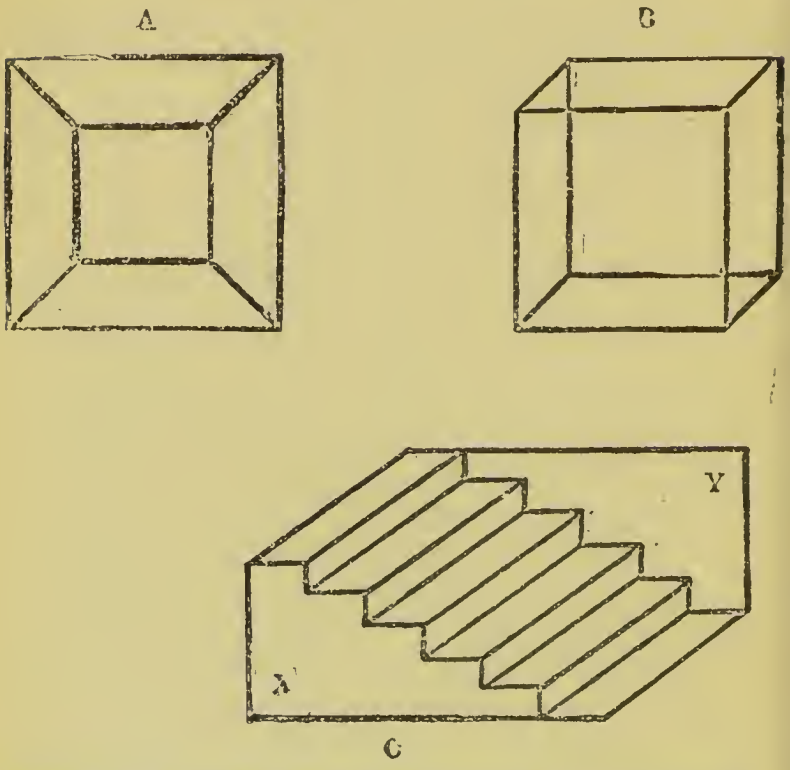
ever, of the delusion, he felt no sentiment save that of wonder at the extraordinary accuracy of the resemblance, and stepped onwards toward the figure, which resolved itself, as he approached, into the various materials of which it was composed. These were merely a screen, occupied by greatcoats, shawls, plaids, and such other articles as usually are found in a country entrance-hall. The spectator returned to the spot from which he had seen the illusion, and endeavoured, with all his power, to recall the image which had been so singularly vivid. But this was beyond his capacity."

This is a good typical case of illusion. We have the previous occupation of the mind with a certain set of ideas; the image of Lord Byron must have been hovering in the "marginal" region of Scott's consciousness ready to come into the focus of attention on the slightest suggestion. We have absence of interesting rival ideas in the field of attention, so that when the image of Lord Byron "in his habit as he lived" is suggested it is less likely to suffer eclipse. The coats and plaids were of course never seen as such; what was seen was ambiguous, and that interpretation is placed on it which suits the particular mood of mind, and so the image of the dead poet is superposed on or read into the data supplied by the eyes. And the important point to notice is that this is in no way different from ordinary perceptions except that the wrong image is suggested. In all cases we have the imposition of a preperceptive image, and this image does not come from without but from within. It does not exist

ready made as a distinct mental fact until the occurrence of a sight sensation which is susceptible of such an image. When it is suggested, the image appears not as an image but as a percept; that is, it is distinctly referred to a position in space outside of our bodies and in front of our eyes. This happens always in visual percepts. The illusion is not due to the fact that we have read into the data of sensation something which is not there. That occurs in all perception. The illusion is due to the fact that we have read into our data something which we ought not—something which further thought or perception will convince us is impossible and absurd, or which is at any rate at variance with what a perfectly sane and healthy person in complete possession of his faculties would read into them, if he had full opportunities of investigation.

In some cases, as we have seen, the data supplied by the senses is open to two or more interpretations. Simple instances of this will be found in the following diagrams. Thus Fig. A may represent a pyramid with the top cut off as one would see it from above, or the inside of a box; in the one case the smaller square represents the top, in the other it represents the furthest side. Fig. B may represent a transparent cube with the lowest line nearest the spectator, or a similar cube with the lowest line furthest away from the spectator; in the one case he is partly looking on the top of the cube, in the latter partly upwards at the bottom of it. Fig. C in the same way represents either a flight of steps or an overhanging cornice, according to whether the surface X

or the surface Y is regarded as nearer to the spectator. In each case the interpretation which



gains the upper hand succeeds in so completely ousting the other that it is difficult for us to conceive of the latter; and the transitions from one to the other percept comes with a curious shock.

In all perception, then, we have much more than the reception of sensations. The mind, instead of being "for the most part passive," as Locke thought, is in a highly active state. The sensations

now received are combined, previously received sensations are revived, an image is imposed on, and fused into a whole with, the sensations; the whole is localized in space, and regarded as a real thing not created by the imagination, but having an existence of its own; and, furthermore, it is recognized as a so-and-so, as a thing of a certain kind, and as having a right to a certain name.

The Personal Factor.

What the images are with which we overlay the data of sense depends on a number of conditions. For instance, our history and experience, our education, our emotional condition, our natural temperament, our race and religion, all predispose us in various ways. We never get free from the predisposition. Thus the image which a Scott would be likely to combine with a percept is seldom the same as that which his cook would be likely to combine with it. If a student of religious ceremonies is taken into a church during Mass he absolutely sees different sights from a man who cares for none of these things. The old native hunter and the newly-arrived subaltern do not have the same percepts in the jungle, even if they have the same data of sensation. In each case things which do not interest and have no meaning for the novice pass by unheeded, while others which interest, but are not understood on account of want of previous experience, are seen falsely. Imagine a savage who has never seen a book, and perhaps even has no conception of a

written language, being taken into a library. He sees horizontal rows of patches of colour, but the significance of those patches of colour is hidden. He possibly regards them simply as adornments. He does not distinguish between the different volumes, but regards a whole set as a single object, as we think of railings or a panelled wall. A European with some education sees books; he knows that each of those patches of colour is a volume containing many printed pages, that it can be opened and read in a certain way. A student sees the works of particular authors, and particular editions of these; his attention is arrested by features which even the second man overlooks entirely. He says to himself, "Ah, there is the new variorum edition of Shakespeare, there is the 'Encyclopedia Britannica,'" and so on. The actual data of sight may be the same in each case, but the percepts which result are widely different.

It is now quite clear that a child or a savage who has never seen an inkstand or a postman's cart will not see the inkstand or the postman's cart when you or I would do so. They must of necessity put a different interpretation on the sensations they receive. The truth can be made clear to them if they have the necessary experience, but not otherwise.

Apperception.

Some psychologists, following the German philosopher, Herbart, call all such recognition or identification *apperception;* and the set of ideas

to which the new idea gets attached is called an *apperceptive system* or *apperceptive group*. Different people form different groups, and what we may call the eagerness of the groups thus formed to add to themselves fresh ideas differs very much. With the student, the group of thoughts connected with his favourite study and the books about it is more eager to attract new ideas than the groups connected with sport or with handicraft. Whatever touches study is instantly recognized; what touches sport is laid hold of very feebly or not at all by the group of ideas whose business it is to assimilate or absorb it. This is really only a rather fanciful way of picturing the facts, which other psychologists have already recognized, though perhaps not so clearly as the followers of Herbart. We know that all fresh ideas are made our own only by assimilation, either subconscious or fully conscious; and that mental assimilation implies some kind of selective activity on the part of the mind, or the contents of the mind, just as bodily assimilation implies some kind of selective activity on the part of the walls of the stomach and the intestines.

All perception is selective. The mind does not come unbiassed to the task of viewing things. Professor Sully, in his delightful *Studies of Childhood*, remarks how very restricted is the observation of the child. Colour has for the child more interest than form. "A little girl of eighteen months, who knew lambs and called them 'lammies,' on seeing two black ones in a field among some white ones, called out, 'Eh! doggie! doggie!' The likeness of colour to

the black dog overpowered the likeness in form to the other lambs close by." He goes on to point out that the extraordinary fancies of the child, the quaint and extravagant resemblances which he sees in things, come from this source. "The reason why it is so easy for a child to superimpose a fanciful analogy on an object of sense is that his mind is untroubled by all the complexity of the object. It fastens on some salient picture of supreme attractiveness or interest, and flies away on the wings of this to what seems to us a far-off resemblance." The child sees the strangest shapes in clouds and in the glowing cinders of the fire, faces, houses, animals. I once knew a child of about five or six who for years was distinctly under the impression that he had seen on one occasion in the western clouds at sunset the vision of a mighty angel sitting on a great white throne. It is hardly necessary to add that his favourite reading at the time included certain chapters of the book of the "Revelation of St. John." Whether this was a case of false perception, or a case of false recollection, it is difficult to say.

How completely the child may mistake vivid images for percepts is seen in the case of dreams. Every observant parent and nurse knows how children mix up their visions with the actual world. An odd instance is given by Dr. Sully: "Another child, a little girl in the same school, told her mother that she had seen a funeral last night, and on being asked 'Where?' answered gravely, 'I saw it on my pillow.'" I fancy one reason why our dream-images in adult life fade

so quickly is because we do not dwell on them, and attach so little importance to them. The child taking them for facts of perception, they attract him by their strangeness and oddity, and he keeps his attention fixed on them sufficiently to enable him to remember them for years. A friend of mine says: "Certain childish dreams of my own remain as vivid as any actual memories that I possess; one of them in particular, which I can positively date as within a few months of my seventh birthday, seems as clear as it was nearly forty years ago."

Recent work by Dr. Hodgson and other members of the Society for Psychical Research has gone far to show that our records of extraordinary and unusual occurrences are much more tainted by fault of memory than is usually thought. "Our researches have led us gradually to attach more and more importance to the effect of time on the value of testimony" (Podmore).

But there is such a thing as direct illusion or false perception, and this process is very closely related to the normal process called perception. A great French psychologist, with the love of paradox which is sometimes found in French thinkers, maintains that all perception is illusive. This is, of course, not to be taken literally; he only means that in every percept there are elements which, unless kept in check, would lead to illusion. In every percept there is the making of an illusion, as in every image there is the making of an hallucination. How, then, can I know a real percept when I have it? The only way I know of arriving at truth is by criticism.

The suspected percept must be brought face to face with other percepts of my own and of others. For instance, I must see whether by moving my eyes, or my head, or by taking a few steps, I can bring about another percept incompatible with the one which claims my acceptance. By walking a pace or two Scott's spectre of Lord Byron evaporated, and so have many other apparitions. When more clearly defined, the percepts of the screen, greatcoats, plaids, and so on, drove out the image which the poet had read into them when more dimly seen. But suppose this fails, and that a percept remains which we feel unable to accept as quite true because it conflicts with our previously acquired knowledge. Let us, in the second place, bring a fresh sense to bear, and add touch and hearing to sight. If this is not possible, optical instruments may enable us to bring such additional facts into consciousness as may settle the question. And, finally, there is the testimony of others, where this is attainable. Thus it seems possible that the so-called canals of Mars may turn out to be mere optical illusions, because it appears as though only one astronomer has been able to see them with any degree of clearness.

None of these ways of checking the percept is infallible ; for instance, even the test of confirmation by others may break down, for such is the effect of suggestion that illusions may be generated in a number of persons together. We tend to see what others see, just as we tend to think what others think. In a sense, we may almost say that ideas under favourable conditions become *catching*.

Suggestion and Perception.

This is such an important fact that a little additional attention may be given to it. We all know that occasionally a person may be led into accepting a false or ridiculous idea by simply suggesting it to him in a quiet and inoffensive way. He will for a moment accept the absurdity, because his attention is not fully aroused, and what there is of it is mainly occupied with something else; we will say watching a distant object. You say to him, "You are an oddity, are you not, Jack?" and he replies, "Yes, I am an oddity." There is a quiet acceptance of what you say, because no antagonistic ideas are aroused. When people are dreaming you can modify their dreams by speaking to them, and you may arouse dream-images by touching them or making slight noises. Indeed, when persons are awake direct sensations may be aroused by suggesting them. If one talks of yawning, people begin to gape; if one talks of vermin, they begin to feel unpleasant tickling and itching of the skin. What occurs only occasionally in persons awake, or in the state of normal sleep, occurs with more frequency and regularity in persons in the hypnotic state. There we sometimes have it in a very high degree, but not by any means always. But we must not think that *suggestibility* is peculiar to the hypnotic state. Every time a card is forced on you in a card-trick, every time that a conjurer makes a "pass," we have the same thing. In fact, nearly the whole secret of the modern juggler lies in this—the

control of the attention of his audience. He has next to no apparatus, and stands clear of tables and cupboards, with sleeves ostentatiously turned up. But in spite of his delightful frankness and air of careless disengagement, he is full of determination that you shall attend carefully to certain of his acts which are of no importance, and shall not attend at all to certain other of his acts which are all-important. He is not so artless as to say, "Look here," or "Look there"; he only suggests the idea. Yet it produces its effect, not only on single individuals, but on whole rooms full of people.

In the best book on conjuring that I know of this is put very clearly. Mr. Edwin Sachs tells us in his *Sleight of Hand* that "the prevailing idea with the public is that a conjurer moves things about from place to place before one's very eyes, but with such extreme rapidity as to avoid detection. . . . Articles are indeed transmitted from one place to another before the eyes of the audience, but it is always *sub rosa*. This is the reason why conjurors say so much about the hand being quicker than the eye, etc. The audience is continually trying to detect movements which are never even attempted, the result being that other movements are conducted with impunity. The conjuror must start with the one principle firmly fixed in his mind—that he is to deceive his audience in every way possible. At no time is he actually to do that which he says he is doing. Every look and every gesture, besides every word, should tend to lead the mind into the wrong groove. *Misdirection* is the grand basis

of the conjuror's actions; and the more natural the performer's movements in this particular, the more complete will be his success."

The conjurer has to divert attention from what he does not want us to see, and therefore tries to fix it on something which will interest and amuse us, while he performs unnoticed his passes, substitutes one article for another, and so forth. There can be little doubt that the vast majority of the better approved phenomena of "Spiritualism" belong to that class of conscious or unconscious trickery of this kind. There is a still greater majority of phenomena which really rests on no evidence which would hold water for a moment; but speaking only of those cases in which at anyrate some degree of precaution against fraud is taken, we may hold with Mr. Podmore that "the phenomena upon which spiritualists rely are such as to require the exercise of continuous observation, and experiments designed to dispense with the necessity of such observation [by means of purely mechanical arrangements] have invariably failed."

The results of suggestibility in hypnotic patients and in the audience of the spiritualist medium are so startling that one is inclined to forget that they are closely related to many very familiar facts. Some of the most striking and apparently exceptional phenomena of physical nature turn out to be merely special cases of well-known laws. Thus the action of the syphon, which, when employed by the Italian lemonade seller still arouses the curiosity of the blasé London street-boy, does not really involve any suspension of the law that,

left to itself, water will not flow uphill; it is explained for us in every elementary book on physical science as a special case of the venerable principle that, left to itself, a smaller weight will not balance a larger one. So is suggestibility after all only found to be a special case of a well-known law, that one idea suggests another. It is a particular instance of the principle that we spoke of in Chapter II.—the law of contiguity. All speech exemplifies it. When I say, "Here is Mrs. Robinson," a mental visage of Mrs. Robinson rises in your mind. As long as you are in your normal state, with full and clear consciousness of all about you, this will not give rise to an illusion. If Mrs. Smith enters instead, a struggle instantly begins between the rival ideas, the nascent or imperfectly formed image of Mrs. Robinson and the percept of Mrs. Smith. In ordinary cases there is no difficulty of decision. The superiority is all on the side of the percept. But let us suppose that the lady calls during a twilight afternoon before the lamps are lit, and that in figure and general appearance she resembles Mrs. Robinson, you may be deceived and accept the suggestion. The percept is too vague and faint to drive out the image. And I have forced on you an illusion which, if you had been alone, you would not have experienced. The verbal percept (the name, Mrs. Robinson) produced in you by me gave rise, according to the law of contiguity, to an image of the lady, and this image was, as it were, impressed on the percept, combined with it, and formed a false percept, that of Mrs. Smith.

Hallucinations

Sometimes false percepts arise without any discoverable cause or object external to the organism. These are not called illusions, but *hallucinations*. No clear line can be marked out between them; they shade off into one another. In some illusions the basis of actual sensation is very slight; in most hallucinations some sensation, especially an organic sensation, serves as a starting-point. Hallucinations are usually looked on as a much graver symptom of mental disturbance than illusions. All sane persons are subject to illusions; but only a few are subject to hallucinations when wide-awake, and under conditions favourable to clear perception. Among the insane they are very common. One patient in Bethlem Hospital used to hear the voice of some female calling to her from her abdomen. An epileptic patient in another asylum used to hear distant sounds of music from the abdomen; they grew more and more loud and distinct, and gradually rose through the chest, neck, and head; when they reached the top of the head she lost all consciousness. Another believed he had a "spiritual wife" within him, who constantly communed with him. "In each of these instances some part of the bodily organism was referred to as the source from which the sensory impression was derived" (Hyslop). As a rule, spontaneous hallucinations occur frequently only in persons afflicted with mental disease. Yet some undoubtedly sane persons suffer from recurrent hallucinations; for instance, Christopher

Nicolai, the German critic and publisher, whose greatest monument is the *Allgemeine Deutsche Bibliothek* in 106 volumes. This unfortunate man, while suffering from intermittent fever, saw figures of men constantly moving and changing; but he always regarded them as hallucinatory. He saw them, but did not quite believe in them. The recent inquiries set on foot by the Society for Psychical Research have proved that occasional hallucinations are much more common among the sane than was formerly supposed. Of men, nearly eight per cent., and of women, just twelve per cent., reported themselves as having experienced them.

Where there is expectant attention there is liability to hallucination. Those who expect to see ghosts are, on the whole, more likely to see them than others. The psychologist, Dr. Parrish, was told by a friend that when he took his usual afternoon walk he used regularly to see at a certain spot the first man and horse of a squadron of cavalry returning from their daily exercise, as they crossed the street at some distance in front. One day, when he had seen this as usual, he began to wonder why the rest of the men did not follow, and he then found out that the men and horses he had just seen, or fancied he had seen, were not real; they were phantoms, or hallucinatory percepts. An American psychologist has produced hallucinations of this sort experimentally. A blue bead one and a half inches long and half as broad was hung up in the Yale Psychological Laboratory by a fine black thread in front of a black surface. This bead

could, by a concealed arrangement, be drawn away and replaced without the observer's notice. The observer, or subject, was shown the bead, and then walked to the end of a marked line on which the distance from the bead was measured; he next walked slowly towards the bead along the marked line, and mentioned directly he saw it. In all he did this twenty times in succession; every now and then the bead was withdrawn, but in many cases the subject still saw the bead as before. About two-thirds of the persons who were tried perceived the bead, or seemed to do so, when it was not there. What they expected to see they saw, whether it was actually there to see or not. Their eyes, and nerves, and brain were all adjusted to see the bead, and they saw it.

Hallucinations, then, can be suggested, as well as illusions; but not, ordinarily, among sane persons in a normal condition. During the hypnotic trance a certain small percentage of persons are susceptible to them; most are not. But those that are susceptible can often be made the victims of hallucination even after they have (at anyrate, apparently) been entirely awakened. Here is an ordinary case. "I say to someone in hypnosis (the hypnotic condition) 'When I cough after you wake, you will see a pigeon sitting on the table; you will be thoroughly awake.' The suggestion takes effect; the subject sees a pigeon where no pigeon is, but it is impossible to make him accept a further suggestion" (Moll.). Very startling are some of the instances given by Binet and Féré in their *Animal Magnetism*. In general character they are all more or less like the one

just given, but they are much more striking because of the full details that are added. Charcot frequently performed the following experiment. He suggested to a subject that on one (which we will call No. 1) out of a number of blank cards a portrait was visible; the subject, of course, saw the portrait; he was then awakened and asked to look through the dozen or so of cards, amongst which was No. 1. When the subject came to this he saw the imaginary portrait at once. In cases such as this some distinctive marks probably exist on the card, such little specks and raised spots as we know to occur, and the hallucinatory image is associated with these, so that directly the patient sees them the image appears. This view is borne out by a number of facts. For instance, for him to see the (imaginary) photograph on No. 1, the card must be held closer to him than a real photograph would need to be held, for the dots, etc., on the surface, on which we assume the recognition is based, are very small. Again, such recognition takes longer than ordinary recognition. Some more quotations from Binet and Féré's interesting book will serve to elucidate the character of these hypnotic hallucinations. "If, during the hypnotic sleep, it is suggested to the subject that a profile portrait is on a table of dark wood before him, he distinctly sees his portrait on awakening. If, without warning, a prism is placed before one eye, the subject is astonished to see two portraits, and the position of the false image is always in conformity with the laws of physics." That is, the hallucinatory

image is subject to the same changes as a real percept would be. "If the subject is made to look at the hallucinatory object through an opera-glass, it appears to be nearer or more distant according to the end of the glass presented to the eye." Imposture is guarded against by not allowing the subject to see which end of the glass is in use, which is easily secured by placing it in a cardboard box, with holes of equal size. In these and other ways it is shown that the laws of refraction and reflection apply to the hallucinatory percepts; and it is difficult, therefore, to avoid the conclusion that in reality something *is* seen, namely, the dots and spots, etc., on the card, and that these form the basis or starting-point of the hallucination. If this is so, it is additional proof that there is no essential difference between illusion and hallucination.

CHAPTER IV

THE DATA OF PERCEPTION

We may now briefly consider the chief kinds of sensation on which our percepts of external things are based. We have several times used the term sensation; let us consider more precisely what we mean by it.

By a *sensation* we mean an elementary mental state, which ordinarily forms a part of a more complex percept, but which, if attention is concentrated upon it, can be known by itself. When

so known it is not regarded as belonging to an external object, but is referred to our own body. Thus, there is the sensation of red, which is usually at once referred to an external object, and forms part of the complex percept which we call a stick of sealing-wax on the writing-table; but which can be introspected as a distinct percept and referred to my own eyes.

Sensations are traditionally classified by reference to the organ of the body from which they originate. Thus, we call sensations of sight, sound, touch, taste, and smell those which originate in activities of the eye, ear, skin, mouth, and nose respectively. But although very important differences of quality are associated with difference of organ, we must remember that some sensations derived from the eye are not purely visual, that some derived from the mouth are not purely sensations of taste, and so on. The sensations derived through the agency of the skin are really of several distinct kinds, and are easily discriminated as such. Then the traditional classification also overlooks two very important kinds of sensations—those arising from movement *(motor sensations)* and those belonging to the general sensibility of the body *(systemic* or *organic sensations)*.

In the first place, we notice that a pure sensation, a sensation without any interpretation whatever, can hardly be said to exist. It is only a hypothesis. We know that our eyes are affected by rays of light. We know that from the change thus produced in the nerves and brain sensations somehow arise. But when we examine our sensa-

tions we find always some interpretation of what we have given us. This is *blue*, that is *red*, implies more than merely passive reception, a mere getting of an impression; even here the mind has added something, for it has revived other sensations of colour and identified the new sensation with some of these, distinguishing it thereby from other sensations not only of colour but of sound, touch, taste, and so on. The recognition of a sensation of blue as a sensation of colour at all implies some reaction on the part of the mind. We must think, then, of a "mere sensation" as a sort of hypothetical or abstract thing, just like a perfect circle or a perfect man, a thing towards which we may approach more or less near but perhaps never exactly attain.

The sensations chiefly concerned in external perception are those of sight, touch, movement, and sound. There are, of course, others; but after all, a civilized man would lose little of the sense of reality and little important knowledge of the universe if taste and smell were lacking. He would lose an enormous deal in the way of pleasure, and some slight amount of pain; but he would not, unless he were a cook or a wine-taster, or something of that sort, have to forego his daily work.

Sensations of Touch.

Sensations arising from the skin embrace those of touch proper, including those arising from contact when the skin is lightly touched, and from pressure; those of temperature; some sen-

sations mainly organic, such as tickling, stinging, itching, smarting, and so on; and some important combinations of sensations of pure touch with sensations arising from movement. Modern experimental psychology has gone far towards showing that the skin is an exceedingly complex organ of sensation. Anatomy shows that the surface is supplied with an enormous number of nerves and peculiar kinds of nerve endings. It may be looked upon as a kind of mosaic, made up of a variety of different sensory organs. Dotted about it, according to recent writers, are minute spots, on which any kind of stimulus, whether made by pressure with an ivory point or by the end of a hot wire or of a cold wire, will produce sensations of touch proper (pressure or contact). Intermingled irregularly with these are spots which are only sensitive to heat, and others only sensitive to cold. Finally, there are spots which are not sensitive to pressure, heat, or cold, but only yield organic sensations of pain, such as that of pricking or stinging, etc. These results are perhaps not yet quite beyond criticism, but a great deal of evidence has already been accumulated which points in this direction. The German psychologists have been in the forefront here, and in the last few years the researches of Blix, Goldscheider, Kiesow, and Frey appear to have taught us more about the skin as an organ of sensation than had been learnt during all the preceding centuries in which men have studied the subject.

Recent experiments have shown that the variety of the sensations received from the skin is very

much greater than has been until lately supposed. After prolonged tracing over the surface of the body with a metallic pencil, which was in connection with an electrical machine, Professor Stanley Hall distinguished pain-points, "thrill-points," "tickle-points," "acceleration-points" (where the rapidity of the movement of his pencil was apparently increased), "blind-points" (where no sensation is aroused), as well as the previously recognised heat-, cold-, and pressure-points.

Localization of Touches.

The skin being such a highly varied surface, it can be easily understood that the power of discriminating sensations of touch varies very much according to the part affected. Thus, if we take the points of a pair of compasses used in drawing, and blunt them slightly so they shall not prick the skin, and apply them to the back of the hand of another person (whose eyes should be closed), we shall find that the two points are not perceived as two, but, so to speak, run together, when the points are less than about 1 to $\frac{3}{4}$ inches apart. If measured long-wise on the back of the hand—that is, in the direction of the fingers—the distance between the points may be greater than if measured cross-wise. On the forearm the distance may be over $1\frac{1}{2}$ inches; on the back, from 2 to $2\frac{1}{3}$ inches. In marked contrast to this, at the finger-tips the points which are more than $\frac{1}{14}$ of an inch apart, are felt as two, and on the tip of the tongue the distance is only about half of this.

Notice that the two points must be of the same

material, and ought to be put down simultaneously. If the points are of different materials, difference of temperature sensations come in to strengthen the purely touch sensation. If put down one after the other it will be found that the power of discrimination is increased; so that we perceive as two points an arrangement which, when applied simultaneously, appears only as one. Again, the discrimination varies, as we have just seen, according to the direction in which the line joining the points runs; if the measurement is made lengthwise the discrimination is less than if made crosswise. Further, the two hands may vary somewhat; thus, the back of the right hand, I have found, is sometimes less sensitive than the back of the left. And practice always increases the power of discriminating—that is, diminishes the distance which must occur between the two points if they are to be discriminated; when, however, fatigue sets in, the powers rapidly decrease. Individuals vary, of course, more or less from the average results here given. As might be expected from the attention they habitually give to touch-sensations, and from constant practice, the discrimination of blind persons will be found much greater than that of others.

Sensations of Temperature.

Sensations of temperature differ greatly from those of touch proper. In some respects they more closely resemble the organic or common sensations arising from the general state of the bodily organs. Recent investigation shows (as

we have just seen) that there exist in the skin points which are, speaking broadly, only sensitive to heat, and others only sensitive to cold.[1] These spots are arranged in rows, slightly curved in arrangement, which radiate from certain points in the skin, particularly the roots of hairs. The cold spots are more numerous than the heat spots, and vary somewhat in their distribution.

When anything having the same temperature as the skin is placed in contact with it, no sensation of temperature as a rule arises. This degree of temperature (called the *zero-point*), at which an object feels neither hot nor cold, varies in different parts of the body, according to the degree of exposure to the air. The tip of the nose has a lower zero-point than the armpit, and therefore the same actual temperature will appear warmer at the tip of the nose than in the armpit. As we pass from a hot room to a cooler, or *vice versâ*, it takes a few minutes for the exposed parts of the body to get accommodated to the new temperature; but the zero-point is in due time lowered, and if the difference does not amount to very much we may in time no longer notice the change. If one hand is placed in hot water and the other in cold, they will feel the temperature of a basin of just warm water

[1] When we test the spots with points of wires heated to a very considerable temperature, it is sometimes found that a cold-spot will respond to the stimulus, and a sensation not of heat but of cold is then felt. Again, points of wires heated to a moderate temperature are responded to by both heat- and cold-spots, and then though we recognize that there is a sensation of temperature we cannot discriminate it as hot or cold.

differently; the hand that has been in hot water will feel the lukewarm water as cold, and the other hand will feel it warm. Then, again, the amount of surface affected varies. We can bear the tip of one finger in water too hot to safely place the whole hand, and water in which we can place the whole hand would be intolerable to the whole body. Bad conductors (like felt or blankets), which are not warmer than the body, may appear warm, because they prevent the radiation of heat from the part touched, and thus keep up its temperature. Good conductors (like metals), which are below the temperature of the body, as a rule appear cold, because they run off with some of the heat; and if hot they appear very hot, because they so easily part with their heat.

Motor Sensations.

Closely associated with touch-sensations are those of movement. They are of very great importance in our perception of objects, especially in relation to space. They reinforce the sensations of touch, sight, and hearing with which they are associated, and the latter appear stronger than they do when unaccompanied by movement. In the same way, movement increases our power to discriminate and to remember sensations of the special senses; therefore we perceive an outline which we trace with our finger as well as observe with the eyes much more clearly than if we merely see it. The child usually learns the form of the coastline of a country or the course of a river

better by tracing it two or three times than by simply looking at it twenty or thirty times. Even movements not so directly connected with the business in hand appear to assist. The child probably gains something by those strange movements of the lips and tongue which accompany the first efforts to write or draw.

There is some difference of opinion among psychologists as to the nature of the motor sensations. After they were first clearly distinguished from ordinary touch-sensations, they were commonly regarded as being the consciousness answering to the flow of nervous energy from the brain to the muscles. They were not supposed to accompany and correspond to the flow of nervous energy to the brain from the surface of the body, as the other sensations were known to do. Recent investigation has, however, gone far towards upsetting this theory. Some modern psychologists maintain that motor sensations are at bottom only sensations of pressure and sensations due to the organic condition of the skin, muscles, sinews, and bones. As the arm is raised various combinations of such sensations are successively produced. The occurrence of a particular set of these sensations in a particular order tells me that my arm is raised or has fallen again; and so with all other parts of the body. It is probable, however, that there are distinct sensations arising from movement, in addition to those arising from mere position of the limbs, head, etc. The surfaces of the joints, as they glide over each other, are, according to Goldscheider, the origin of these special sensations; and this opinion has been

accepted by many other authorities. Another German investigator, Schiff, has put forward the idea that changes in the tension of the skin are the physiological cause of the motor sensations; but the motor sensations derived from the vocal organs and the eyes can scarcely be explained in this way. It is difficult to resist the conviction that the muscles have something to do with the origin of motor sensations, though not everything to do with it.

While there is not enough evidence to show that the outflowing currents of nervous energy sent from the brain to the muscles are the immediate cause or physiological concomitant of motor sensations, these currents almost certainly assist in producing them indirectly by the changes they bring about in the shape and size of the muscle. What we call motor sensations, then, are probably very complex, and are a combination of conscious and subconscious elements arising from changes of various sorts in the member moved, alterations of the size and shape of muscles, blood-vessels, skin, mucous membrane, etc., as well as from friction and pressure in the joints.

Sensations of Sight.

Sensations of sight arising through the eye are of two kinds—those which are directly due to the effect of the rays of light on the retina, and those which are due to the movements of the eye or parts of the eye. It is of the former, called the purely optical sensations, that we must first

speak. They include those of brightness and of colour. Their usual physical cause is found in the transverse undulations set up in ether in various ways, when these undulations are within certain limits of rapidity. When a wire is heated in a spirit lamp placed in a dark room the particles of which the wire is composed are thrown into a state of violent vibration. As the heat increases the vibrations increase in rapidity. They are communicated to the ether, which surrounds and permeates everything; and the movements thus set up—infinitely small waves on this infinitely big ocean which fills all space—are sent off on their journey in all directions. At first the undulations are too slow to affect the retina, though they affect the skin. We can perceive that the wire is hot if we hold it to our cheek an inch or two away, but our eye reveals no change. As the heat increases the rate of the waves increases, and when they reach to the enormous number of about 450 billions—that is, 450 millions of millions—per second we see that the wire is glowing red. The ordinary physical cause of sight, then, is found in the fact that undulations or vibrations of almost inconceivable rapidity are affecting an organ specially adapted for receiving them—*viz.*, the retina.

But we must remember that sensations of sight may be produced in other ways, though such sensations are of no use for the purpose of giving us knowledge of external things. If in the dark, with our eyes shut, we press the closed eyeball with the end of a penholder, we see a

circular patch of light at the opposite corner; this is known as a *phosphene*. When a weak electric current is sent through the eye, and also when the current is broken, a flash of light is seen. These little experiments tend to show that the particular kind of sensation we call light derives its character not from the nature of the stimulus but from the nature of the nervous mechanism which is affected by the stimulus. Thus the same thing is found in the case of other sensations. The same weak current of electricity which, passed through the eye, produces a flash of light, when passed through the tongue or nose produces a sensation of taste or smell. Rapid undulations of ether falling on the cheek or forehead produce the sensation of warmth and no sensation of light, but falling on the retina give us a sensation of light and no sensation of heat.

If we think this over we shall see that it involves the conclusion that what we call *light* does not exist in the universe apart from eyes to see it. The "light rays" that physical science deals with are in themselves no more red or blue than the dark heat rays or than the X rays of which we have heard so much of late; the sunshine would have no splendour but from the eyes which see it. If eyes did not exist, the sun's rays would produce their beneficent effects on plants and animals just as they do now; but the splendour and the beauty would not exist. They are due, not to the physical cause, but to the mysteries of a piece of living tissue, the retina, which has been given the power to select those rays

composed of undulations of a certain degree of rapidity, and to somehow make them the occasion of mental facts of unspeakable beauty. It is therefore conceivable that other organised beings might become keenly sensitive to the agency of rays of higher or less velocity than those which lie between the limits of 450 and 800 billions per second, that is, they might be able to see the rays which we call dark heat rays and ultra-violet rays.

The eye is in construction essentially an optical intrument of the same general type as a camera obscura or a photographic camera. An arrangement of lenses focusses the rays of light in such a way that the image of the object seen is thrown on to a screen at the back. An automatic diaphragm (the *iris*), capable of enlarging or diminishing the opening through which the rays pass, according to the intensity of the light, and an automatic arrangement for altering the curvation of the principal lens according to the distance of the object, are two advantages possessed by the eye which the most ingenious American camera has not at present been able to imitate. The screen on which the image falls is a highly complex structure of several layers. In the centre of the retina is a little oval depression about $\frac{1}{10}$ of an inch long, in which all the layers except one—that known as the layer of *curves and rods*—disappear or become very thin. This depression is known as the *yellow spot*, and when rays of light fall on this the resulting sensation is most distinct. Less than a quarter of an inch to the inside of the yellow spot—that is, nearer to the nose—is the

blind spot, through which the fibres of the optic nerve pass. This is insensitive to light, as a well-known experiment serves to show. If the

X A

reader holds this page about a foot away, shuts the left eye, and fixes the other on the cross, he will see the letter A not clearly but still sufficiently well. As he brings the paper nearer the A suddenly disappears from view, but reappears when the page gets still nearer his nose. With most people it will disappear at about the distance of 8 or 9 inches and reappear at about 6 or 7 inches, if the cross comes just in front of the eye. This disappearance of the A occurs because at that distance the image of the letter is thrown on to the blind spot.

Colour.

The purely optical sensations given us through the eye are those of *brightness* and *colour*. The latter are due to the simpler cause. If a ray of physical light—that is, a ray of ether vibrations—were to consist entirely of vibrations of the same length, we should get a colour sensation. If the undulations succeeded each other at the rate of 450 billions a second, the colour sensation in a normal eye would be red; if about 526 billions a second, the colour sensation is yellow; if about 590 billions, green; if about 720 billions, blue;

if 790, violet. If the undulations became much quicker than that we should no longer perceive them as light; in other words, the ultra-violet rays are invisible, though very active in producing chemical changes, as every amateur photographer is aware.

The reader knows that if a ray of white light is passed through a prism it is broken up into a bright band of colours. This *spectrum*, as it is called, consists of hundreds of distinguishable shades of colours. They all pass into each other, but the colours always come in the same order, with the red at one end of the spectrum and the violet at the other. For convenience' sake it has been customary to recognize certain colours as "primary"; but there is no reason whatever for considering that red, violet, and green, or red, blue, and yellow, are in themselves more simple than the others. Why is it that just these five or six colours have been always selected as primary? Because they are the colours of objects which must always have strongly appealed to the colour sense of primitive man. Blue is the hue of the sky; green that of vegetation; yellow that of sand and earth. Red is the colour of blood, and the very name *red* (like the German *roth*, the Welsh *rhudd*, and the Greek ἐρυθρός) is connected with the Sanskrit word *rudhira*, meaning blood.

If all the colours are mixed together, or if two colours form certain separated portions of the spectrum (red, green-blue; orange and blue; green-yellow and violet) we get the sensation of *white*. That is, by putting together the

results of our analysis of white light we get white light again. White light, then, is more complex, physically speaking, than red light or green light; but the sensation white is just as simple as the sensation red or green. The stimulus to the retina is more complex, but the state of consciousness which it gives rise to is not. The sensations we call, white, grey, and black (of which many hundred intermediate shades can be detected) are all varieties of *brightness;* they are all due to the stimulus of mixed light of different degrees of intensity. Pairs of colours which, like red and greenish blue, yellow and indigo blue, green-yellow and violet, together give the sensation of white, are called *complementary colours.*

There are some very interesting facts connected with our sensations of colour. The existence of the strange defect called *colour-blindness* is well known. The retina of a person who suffers in this way is insensible to certain kinds of rays. Thus a man will be unable to recognize red rays as such, while recognizing green and yellow rays; the red rays appear just the same as green and yellow rays, and he sees no difference in the colour (though he perhaps sees difference in brightness) between a stick of sealing-wax and a leaf of a tree. This defect occurs in at least four per cent. of men in civilized countries, and Government has found it necessary to apply elaborate tests to prevent colour-blind persons from becoming railway signalmen, mates or masters of ships. Unfortunately the kind of colour-blindness which is most common is that

which most completely unfits a man for employment. For while red-green colour-blindness is relatively common, yellow-blue colour-blindness is extremely rare. Total colour-blindness, in which only shades of brightness (that is, white, grey, and black) are visible, is also very uncommon. No satisfactory explanation has yet been found for the phenomenon, which doubtless depends on some peculiarity in the structure of the retina. It undoubtedly tends to be hereditary. Not only was John Dalton, who discovered it, himself colour-blind, but his brothers also.

Different parts of the retina vary in their susceptibility to colour. At the centre the sensibility is greatest; in the outer regions of the retina coloured rays appear white or grey; in the intermediate portion the degree of sensibility to colour gets less as we leave the centre. In practice we overlook this, just as we overlook the existence of the blind-spot. All parts of the field of vision appear to be equally full of colour. But the reader may convince himself of the truth by shutting one of his eyes and carefully fixing the other on a spot directly in front, and getting a friend to present at the side pieces of coloured paper or cloth all of the same size and shape. He will find that he has very much more difficulty in identifying the colours than if the pieces are held just before the eye, so that the rays from them can fall on the centre of the retina.

The colour-susceptibility of the two eyes of the same person may also differ, though this is unusual. When the intensity of the light is very small, all colours except red disappear, as we see

in the evening twilight; when the intensity of the light is very great colour also tends to disappear, red and green become yellow, and at last only white is seen.

Complementary colours, when placed near each other, reinforce each other. Thus red placed on green looks redder, while the green background looks greener, than when they are separately seen. This, of course, is well known to all artists and dressmakers. In the same way, if a piece of white paper is placed on a green surface it tends to look red. This seems due to the effects of exhaustion in the retina, and to be due to the formation of a negative after-image.[1]

Besides the purely retinal sensations which we derive from the eye, *viz.*, those of colour and brightness, there are others which arise in consequence of the movements of the eyeball. The eyeball is held in position by six muscles, and it can be moved in almost any direction by means of them. As it moves sensations, more or less subconscious, arise, and these sensations have much to do with our perception of the spacial qualities of objects. To them we shall have occasion to refer when we come to speak of the origin of our ideas of space. The varying degree of convergence of the eyes plays an important part in our estimation of distance. We shall see that the position of different objects in the field of vision is not settled by the position of their images on the retina, but by the movements of the eye.

[1] See p. 36, above.

Binocular Vision.

The two eyes ordinarily act together as one organ of sense, at anyrate for the adult. Although there are, of course, two images thrown on the two retinas, only one percept is formed of the object. How is this? The explanation lies in the same set of facts which explain why we only perceive one object when the two hands co-operate in holding it. Experience teaches the child that the two distinct sets of touches and motor sensations do not under certain conditions imply that there are two objects; and he knows this even when he lays hold of a thing in the dark. In the same way he learns that when he receives through the two eyes very similar pictures the two pictures really refer to one and the same object, and the two coalesce. As far as the eyes themselves are concerned, we may say that by constant use certain parts of the two retinas become related, so that when a similar retinal image falls on both only one object is seen. Experiment shows that such *corresponding parts* actually exist. Let the reader hold up a pencil at arm's length and look at it; his two eyes will instantly adapt themselves so that the axes converge somewhat, and he will be seen by any bystander to squint a little. By this convergence the image of the pencil is made to fall on points which correspond, *viz.*, on the centre of the yellow spot and just above and below it, and he therefore sees only one object. Let him now look at the pencil with one eye, while he fixes the other on the wall just beyond; he instantly sees

two pencils. The same thing will happen (after a little practice) if he presses one eyeball slightly so as to rotate it a little to left or right. When a man is drunk the muscles of his eyes become partially paralysed, and do not adapt themselves properly, so that the images do not fall on corresponding parts; hence the phenomenon of double vision which forms so characteristic a feature of the state of intoxication. Even when the man tries to fix his eyes properly he fails to accomplish it. Of course we are not really aware of the image on the retina itself, since the fact that an image exists in the eye at all is a comparatively recent discovery, and is certainly known to only a very small percentage of the human race even at the present time; but we are aware of the set of sensations which that image arouses. When those retinal sensations are practically the same for both eyes, and are referred to corresponding parts, only one percept is formed. Here we have a striking instance of the way in which the percept is related to the sensations which furnish the data for it. Two sets of sensations are rolled into one so completely that, under normal circumstances, no one even suspects that there are two sets. We do not, in fact, become aware of them as sensations at all, but refer them to an object in space. It is here very clearly seen how completely perception is a matter of interpretation, and that it is not merely the passive taking in of sensation.

Sensations of Hearing.

Sensations of Hearing are of less importance than

those of sight and touch in giving us knowledge of the external world. But they are of enormous importance in connection with language, and have therefore had a marked influence on the development of the mind. We read so much nowadays that we almost forget that spoken language is the original form, and that for the vast majority of the human race in the present as well as the past it is the only form. Music, too, with all its subtle pleasure, plays so great a part in adding to the happiness of man that the ear seems scarcely less necessary than the eye. As is well known, sensations of hearing are divided into two chief groups, noises and musical tones. A musical tone is produced by vibrations all of the same degree of rapidity, or of vibrations whose respective rates bear some fixed relation to each other. A noise is produced by vibrations of many different kinds. In both cases the particles of the air are thrown into vibration by some means or other, only in one case we have a relatively simple set of vibrations which do not interfere with each other, and in the other a mere confused clashing of vibrations.

The ear is a scarcely less complicated organ than the eye. The outer ear, which is the part we see, gathers and reflects the sound, which is carried along the tunnel to the membrane of the drum of the ear, a thin membrane of oval form, which separates the outer from the middle portion of the ear. Attached to the inner surface of the drum is a small chain of three delicate bones, which carries the vibratory movements of the membrane across

the chamber of the middle ear. One end of the chain is fastened to the drum of the ear, and the other end to the membrane which covers one of the openings of the inner ear, which is lodged deep in the bones of the skull.

The inner ear contains two extremely complex organs, the *semi-circular canals* and the *cochlea*. The former, besides doing work in connection with sensations of sound, are supposed to be the source in which certain subconscious sensations that help us to a knowledge of the position of the head take their origin. The latter—a structure like a minute snail shell, one quarter of an inch high—is supposed to be the source in which sensations of musical tone originate. It contains a vast number of fibres known as the *arches of Corti*, to which a portion of the nerve of hearing is distributed; and Helmholtz believed that these fibres, which bear some resemblance to the strings of a piano, being arranged parallel to each other and being of different lengths, are the means by which vibrations of different rates are sorted out and separately communicated to the brain.[1] The whole of the inner ear is filled with a watery fluid, known as the *endo-lymph*.

However they may be received and communicated, musical tones are of great variety. When regular vibrations take place, about 16 to the second, a tone begins to be heard; by many persons, however, no tone is heard until the vibrations reach nearly double that rate. Thirty-

[1] There are reasons for thinking that the *basilar membrane*, just below the *arches of Corti*, is the immediate analysing organ.

two vibrations per second give us the bottom C of a piano, three octaves below the middle C; the thirty-two foot unstopped pipe of an organ produces a tone due to 16 or 17 vibrations per second, which is an octave lower. The highest tones which can be heard are those produced by about 40,000 vibrations; here again differences occur, as might be expected, and a good many persons cannot hear any sound when the vibrations are more frequent than about 20,000 in the second. This last number would produce a sound three octaves above the highest D on a modern piano, while 40,000 would give one an octave higher still. The differences of pitch are like those of colour. The physical causes which produce them are practically continuous, and if we had perfect ears we should be able to discriminate some 20,000 tones, or even more. As a matter of fact, the power of discrimination differs greatly with different persons; it depends on the original endowment of sensitiveness, on practice, on the position of the given notes in the general scale, and other conditions. A man with normal ear, but without special practice, can in the middle octaves detect a difference in tone answering to 8 or 10 vibrations. A trained musician has a much greater capacity than this. In the middle octave a musician with good ear can detect some 200 tones, of which music only recognizes a little more than a dozen. In the highest and lowest octaves discrimination is much less fine.

Other Sensations.

Sensations of Smell and Taste are of so little importance in building up the fabric of our

knowledge of the world, though of great value in other ways, that there is no need to dwell on them. The qualities of smell and taste sensations do not seem capable of the same exact discrimination as those of sight and hearing. At any rate, up to the present no success has followed in the attempts made to group them. We all know the scent of lemons from the scent of onions or that of musk, but we cannot arrange them in any sort of series like the scale in music or the colour spectrum in the case of sight sensation.

In addition to the special sensations and the sensations of movement there are a number of *sensations produced by abnormal conditions of the system.* Ordinarily, we do not receive any sensations from the movement of our heart and lungs, or from the condition of our digestive organs. It will be easily inferred that animals whose attention was largely taken up by sensations arising from the ordinary activity of their organs would be at a distinct disadvantage in the struggle for life. The monkey whose attention was mainly taken up by the sensations due to the movements of his heart and respiratory machinery would soon starve or be captured by beasts of prey. And so with men. The struggle for existence must long ago have crushed out any undue tendency to notice the sensations which may arise from the working of our machinery. It is only in abnormal states of mind, such as hysteria, madness, and the hypnotic state, that we pay any attention to them. When, however, anything goes wrong, or when from any cause an extra amount of stimulation occurs, sensations

(which are usually referred to the organ involved) soon arise. The most frequent are those of the alimentary canal. When the body is in need of food or water, and in certain cases of disease, sensations of hunger and thirst arise; when we have eaten just enough a pleasant sensation makes its appearance; when we have eaten too much a painful sensation of oppression occurs. Fatigue, giddiness, the sensations of pain which accompany a wound or sore throat, are other examples of organic sensation which forms a link between sensation proper on the one hand and the emotions on the other. The most specialized types approach very near to the five senses in their comparative definiteness and in our power to localize them; the least specialized—like those of the general *malaise* which so often heralds an approaching illness, or those sensations of exhilaration which we experience when out for a walk on a fine, fresh, sunny morning—have many of the characteristics of emotion.

CHAPTER V

HOW WE COME TO KNOW THE POSITION OF THINGS

One of the most important kinds of knowledge that we have is that of the position of things. Some other facts are more necessary for the immediate needs of animal life, and for some days or weeks after birth the child has no

knowledge of the position in space of such bright objects as attract him; taste and the sense of temperature are for him much more important. But this very soon passes away, and for all the needs of practical life the knowledge of the position of objects in space is of supreme interest to us. How can we reach anything, even if we have gained the most perfect command of our limbs, and even if we recognize what the thing we want is, unless we know *where* it is?

At the first glance it looks as though the knowledge of things must be given in the very fact that they are perceived. In a certain sense this is true. If we do not know where to locate a certain impression in space we are not sure what that impression exactly signifies. The apparent size of the impression of an object differs according to its distance, and until we are sure of its distance we cannot be sure of the object. Is this tapering grey object we see on the top of yonder hill, overhung with trees, part of the spire of a church on the other side, or a gas-standard, of which the lamp is hidden by foliage? We cannot quite settle this question until we know the distance of the grey object. If it is only a hundred yards away, just at the top of the hill, it is a gas-lamp; but if it is half a mile away, we put it down as the top of a spire.

Berkeley.

Modern psychology has proved that the knowledge of the distance, direction, size, and even shape, of things we perceive is not given in the

sensations themselves. It was in 1709 that George Berkeley, afterwards Bishop of Cloyne, but at that time a young graduate of Trinity College, Dublin, published his *New Theory of Vision*, in which he showed that seeing an object is not a mere reception of sensations, but an interpretation of hints given by sensation. "Looking at an object, I perceive a certain visible figure and colour, with some degree of faintness and other circumstances, which from what I have formerly observed determines me to think that if I advance forward so many paces or miles I shall be affected with such-and-such ideas of touch; so that, in truth and strictness of speech, I neither see distance itself nor anything that I take to be at a distance. I say neither distance nor things placed at a distance are truly perceived by sight. This I am persuaded of, as to what concerns myself; and I believe whoever will look narrowly into his own thoughts will agree with me that what he sees only suggests to his understanding that after having passed a certain distance, to be measured by the motion of his body, which is perceivable by touch, he shall come to perceive such-and-such tangible ideas, which have been usually connected with such-and-such visible ideas."

This important statement he proves almost up to the hilt, and although some of his demonstrations contain unguarded assertions, yet on the whole it is not too much to say that he here made as striking a discovery as any made by his great contemporary, Newton, in the realm of physical science, and that all the modern psychology of perception is based on it.

After reading and considering the account we have given of the process of perception (Chapter III.), the reader will probably be prepared to agree with Berkeley and the modern psychologists that distance is not immediately revealed to us directly we receive a sensation, but that our recognition of it is due to a process of unconscious inference, like the recognition of the nature and meaning of the object itself. A gentleman once told me that he was looking through a telescope at a distant building, placed in perspective; that is, in the line of a road which ran directly from him. The sun fell full on the side of the building, but to his surprise he could not discover the opening of a large archway which he knew to be there. He looked again and again through his glass, and then moved it upwards and downwards, when he saw distinctly the shape of the opening. The two sides of it had appeared continuous as long as he did not see the arch at the top of the opening or the road at the bottom. Why? he asked. I told him, simply because he could not see distance, and there was not hint enough in what he saw through the telescope to suggest it. It seems the sun fell fully on the archway, and no shadow helped to suggest the gap between the two plain brick sides of it, which were understood as forming one continuous surface.

Among the chief facts which serve as hints to indicate distance are the comparative smallness of the image, where the normal size of the object is known, and the distinctness and colour of the image. This latter is perhaps what painters mean by aërial perspective; distant objects must

be represented not only smaller, but less clear and more blue than near ones. The perception of other objects and our estimate of their size and position has also its effect. And further, there are the subconscious or obscurely conscious sensations which reveal to us the degree to which the eyes converge,—for in order to see near things we have to squint a little,—and the degree of flattening of the lenses of the eyes,—because to see things that are distant the lenses must be less convex than to see those that are near.

Since Berkeley's time his line of thought has been carried further; and to-day the mediate and complex nature of the perception of all space relations is generally accepted by psychologists. Not only our perception, distance, and magnitude, but also our power to localize the position of a touch on the surface of the body, and the power to localize the direction from which a ray of light comes, are the results of a process of thinking set on foot by the sensations that reach us. Modern writers, it must be understood, do not accept the whole of Berkeley's teaching in his *New Theory of Vision*, but they agree in holding that experience is necessary to give us space knowledge.

Localization of Sensations.

When the baby gets pricked by a careless nurse he is aware of an uncomfortable sensation, but he is no more aware of the *place* in which he is wounded than of the nature of the instrument by which the injury is inflicted. He will learn both in time by experience; he will fix his attention on

the phenomenon of pin-prieks, and systematieally investigate it. Every child is a philosopher without knowing it, and the amount of serious, systematie, and continuous study gone through in those first few years of babyhood is little less than appalling.

Let us suppose that a baby, a few days old, is prieked on the right knee. The only eonseiousness we ean suppose to be aroused is one of pain, and the only response is eertainly an instinctive shriek and eonvulsive movement of the limbs. If the same thing happens to a ehild of two or three years old, the response is very different; the shriek may or may not eome, but the hand will go down to the right knee in an endeavour to remove the cause of offenee. How does this change eome about? In two ways; first, the ehild has learnt to localize the sensation; and, seeondly, he has learnt to use his hands. But even if the new-born baby were able to eontrol his limbs, there is evidenee to show that he would be quite unable to move his hand to the seene of disaster. This also, as we have said, has to be learnt by experienee, and is actually learnt in the first few years of life. As in all other pereeption, the problem is, how to read the hints given by sensations, whieh differ as mueh from the thing signified as the printed words on this page differ from the sounds they represent. As the power to read them inereases, the individual sensations lose their interest for us, and we have seen it is a general law that what does not interest us and arouse our attention tends to disappear from eonsciousness, so the sensations which serve as hints

disappear, and are, as it were, absorbed into the complex percept of which they form part. The child of two or three appears to feel or see immediately all that it has learnt to read into the sensation of pin-prick.

We saw in the last chapter that the skin varies very much in structure. Every square inch of skin has its own character. Hence it follows that any sensation arising from touching a particular portion of skin will have a special character. The sensation aroused by touching the elbow is different in kind from the sensation aroused by touching the cheek or the knee with exactly the same object, because the anatomic structure is different. It feels different, as we say. When anything touches me on the back of the neck I subconsciously recognize the particular quality of sensation which means back of the neck. It is true that when I was a baby I did not know that that particular kind of sensation meant a particular place on the surface of my body; now I do, because I learnt it for myself, like all other babies. Side by side with the particular kind of sensation which I feel (pin-prick, pencil touch, finger touch, etc.) there are aroused a number of dim sensations, some quite subconscious, others sufficiently strong to be separately recognized, which are characteristic of the part of the skin touched. They are called the *local sign* of that part. In the baby they are probably very indistinct, and he has both to make them clearer and learn what they signify. The pin-prick in his knee arouses such a group, though at first he does not discriminate it, any

more than the prick itself. He gradually learns to recognize the local sign, and to recognize it as the local sign of a particular place on his body. Later on, when he has thoroughly learnt his lesson, probably the local sign again becomes fainter; it is of less interest for him. The smallest hint is sufficient to enable him at once to fix on the spot which is touched, so that he no more notices it than we notice the exact proportion and shape of the letters which make up the words we read.

The work of learning to understand the local signs is chiefly carried on by means of movement. The baby's limbs are constantly passing over each other; whenever he has nothing else to do, he explores the surface of his body, and in this way he gets a sort of topographical knowledge of the surface. He touches one side of the nose, and a particular local sign is brought before consciousness; then he touches the other side, and another local sign somewhat different is aroused. He touches one of his toes, and an entirely different local sign comes into consciousness. The different appearance of the parts to the eye, and the sensations which accompany the change from one posture to another (*motor sensations*), both combine to give a meaning to the local sign; that is, to the particular group of skin sensations which always accompanies a touch or prick or blow on a given part.

Psychologists have of late perhaps somewhat over-estimated the importance of the part which sensation of movement plays in this education, since the lower animals acquire considerable

powers of localization with very little "exploration of the surfaee," such as the human infant indulges in. A puppy or a frog does not constantly investigate the surface of its body with its limbs or mouth, and yet they soon acquire the power to touch the spot tickled or otherwise stimulated. Sometimes I have my doubts whether the healthy human infant is quite such an energetic explorer as he is usually represented by psychologists.

What is true of the skin as an organ of sensation is true of the eye. We learn to tell the position of things in space through constant use of our eyes. The retina, as we have seen is a sort of mosaic, and every part of it has its own special quality. Suppose a ray of red light falls on a certain spot of the retina which we will call A, this awakens the particular kind of sensation which is always aroused when the spot A is stimulated, as well as the sensation red. If it falls on another spot, B, the other side of the centre of the retina, another "local sign," one associated with B is aroused. Similarly every spot on the retina has its own local sign, made up not only of the imperfeetly-felt (subconscious) retinal sensations derived from the partial stimulation of the surrounding "cones and rods," but of certain sensations of movement closely associated with these. Let us see exactly what this means. A red ray from a distant railway signal lamp falls on the spot A of my eye. For the sake of simplicity I will assume that I am one-eyed. Instinctively, in order to see it more clearly, I move my eye towards the

lamp; that is, I move it so that the ray falls on the centre of the eye. This movement, I may add, is very early acquired by children; even in the first few days after birth a tendency shows itself for the eyes to follow a light, and even for them to converge on an object which is too near to be seen with the lines of sight quite parallel. My eye thus swings round automatically so that the bright red spot moves from A to the centre of the yellow spot. This movement means, first, a set of obscure retinal sensations as some hundreds or thousands of "cones and rods" are rapidly passed over by the light; secondly, a set of obscure motor sensations due to the contraction of the muscles of the eye, the pressure on the socket, etc. This particular combination forms the local sign of the spot A. It is feebly aroused even when the eye does not move, if a ray of light falls on A. To B, and to every other point on the retina, belongs also a local sign. Consequently, directly a ray of light falls on one of them I am aware of the direction in which the ray is coming, which is the same thing as the direction in which I must look if I want a perfectly clear image of the source of the ray.

In a rough way we have shown how the great lesson of localization is learnt. It takes years to acquire it, and our education is still going on. Some parts of the body are but little trained. Touches on the back are less perfectly localized than touches on the face, or legs or arms, because the exact position of the touch on the back does not ordinarily concern us very much. But if you

will take the trouble to educate your own back you will find that in a few days you can learn to locate touches with much more accuracy than you do at present.

Erect Vision.

We may now try to explain what is always a puzzle to thoughtful people who know something of physiology. In accordance with the laws of optics the image of an object is found on the retina upside down ; how is it that we do not see it upside down ? The answer lies in repeating what we have so often said before ; a perception is not the consciousness of a physical stimulus as the stimulus is in itself, but an elaborate state of consciousness, put together on the hint given by the physical stimulus. The image on your retina is not actually perceived by you at all. It simply brings about that a certain number of the "cones and rods," the elements that make up the mosaic surface of your retina, are affected. The image does not get absorbed by the retina and somehow pass into the brain, and then somehow get known as a percept. Physiologists and psychologists alike know that this is impossible and absurd. The fact that the physical image falls on your retina gives rise to a mass of unnoticed or subconscious sensations, which are taken up into and form part of a still vaster mass of revived sensations of sight, touch, and movement, and this is recognized as a thing of a certain sort, having a definite place in space. Objects are seen in the position in

which touch and motor experience tells us they actually are. Experience shows us that to touch the top of the lamp we have to raise our hand a certain distance against gravity, and that to touch the bottom afterwards we have only to let the hand fall in the direction in which its weight pulls it. To see clearly the top of the lamp chimney I must make a certain movement of the eye. This is made by a certain muscle or combination of muscles; it has a certain character of its own, and I know that it is in the same direction as the movement of my hand, viz., against gravity. That is enough for us. There is no question of *correcting* the inverted image, simply because we do not know directly that any image (inverted or otherwise) exists in our eye at all. The experiments recently made by Mr. G. Stratton, an American psychologist, tend to confirm this view. This enthusiastic experimentalist wore for three days a bandage over one eye, and in front of the other eye a double convex lens which inverted the image, so that by the double inversion the image was actually projected erect on the retina. The immediate consequence was that he saw every object upside down. At first, of course, he was excessively bothered by the change, but towards the close of the period there were signs that his mind was accommodating itself to the new condition of affairs, and that it was beginning to read the image aright. That is, he began to see things erect, because experience was beginning to teach him how to read the new retinal sensations. The language had changed, but the meaning was the same; and

after two or three days he had begun to automatically realize that the new sensation symbols meant the same as the old.

CHAPTER VI

FEELING

LET us imagine that you are in a passion. You have been lying quietly in a hammock reading a novel and smoking a cigarette. A practical joker of your acquaintance, full of malicious energy, slips behind you unseen and unsuspected, and rushes in upon your repose with a yell of ungodly triumph. What happens?

There is, of course, the perception of the sound and the sight; you recognize the percept more or less, and locate it. "There is Jones!" But that is by no means all. In addition to the percept, a wave of what we call *feeling* makes itself known to you; and this may lead to words and movements which the mere percept certainly would not. You use a hurried exclamation of annoyance, and either call or think of Jones as a more or less condemned fool. You frown and clench your hand, and unless you are a very amicable person you find a difficulty in being cordial to Jones for some seconds. The state is one which you would rather not have experienced; it is unpleasant, annoying, even painful. But it has other qualities besides the quality of unpleasantness. That is shared by the feeling we

call fear, and the feeling we call sorrow, and both are quite distinguishable from the present, which we recognize as *anger*.

Now let us take a more serious case. In an outburst of uncontrolled anger, such as one sees in a child or a savage, and which one may retain as a reminiscence of childhood, we get a great increase in the circulation of the head and upper part of the body, especially the forehead, where the great veins stand out in startling prominence. Sometimes this excessive congestion gives rise to bleeding from the nose, and even to apoplexy and death. The smaller blood-vessels in the skin are also congested, and the face is therefore flushed, and even crimson. The muscles are no longer under complete control; but they are stimulated to act by great activity of the nerves that control them, so that the movements are clumsy, although violent. The opponent who gets in a rage is at a distinct disadvantage, as every reader of novels of adventure well knows. The breathing is irregular and painful, the nostrils are widely expanded, and the chest labours. The teeth are clenched; the lips are drawn back as in an angry dog, so as to show the organs of primitive warfare; the fists clenched and the arms advanced. A curious change takes place in the tones of the voice, the vocal chords are under imperfect control, and the sound becomes grating and unmusical, and the man may repeat a single word with increasing vehemence, or fall to growling like a beast. The muscles of the face, and especially of the lips, are trembling with convulsions; the eyes appear staring, and flash with a lurid

light which we see in them at no other time. Sometimes the whole body trembles, and sometimes a hideous pallor takes the place of the bright red flush. The secretions are greatly altered. As is well known, the milk of a mother who is angry becomes a positive poison to her babe; and the investigations of Trousseau and other physiologists have shown that the saliva becomes charged with an appreciable quantity of the poisonous organic compounds known as ptomaines.

In this analysis of the state of rage we have not attempted to keep distinct the purely mental and the physical characteristics. In fact, it is one of the special features of what we call an emotional state that the two are so closely and so obviously connected. When you simply perceive Jones, or think about Jones, there is no bodily disturbance. When you are angry with Jones, a whole series of bodily disturbances take places. No doubt every thought is accompanied by some change in the cells of the brain, but the change is, comparatively speaking, slight, and is quite inaccessible to our notice. Even now the most accomplished physiologist has no exact conception of what this brain-process may be, and no physiologist expects that his successors, say a hundred years hence, will have discovered any method of making it visible. But the bodily accompaniments of emotion cannot be overlooked; indeed, they are absolutely necessary to the emotion. They are not merely expressions of an emotion already complete without this; they are the very basis and substance of the emotion itself.

Looked at as a mental fact, an emotion has two essential elements: first, the feeling of pleasure or pain, of liking or disliking; secondly, the more or less confused presentation of the organic sensations which arise from the bodily changes which we commonly call its expressions.

Pure Feeling and Sensation.

The feeling of pleasure or pain is closely connected with desire or aversion; in fact, it seems the same thing looked at from another point of view. What we mean by pleasurable feeling is such feeling as we like or wish to retain; what we mean by painful feeling is such feeling as we desire to get rid of. It is true that we often use the word "pain" to indicate a specific kind of sensation, as when we speak of a pain in the head or in the fingers. In this case there are two distinguishable mental facts which may exist apart. One is the particular kind of elementary percept, let us say sensation of burning, which we can definitely locate at a given spot on the body; the other is the feeling of dislike or aversion, the shrinking from and hatred of the sensation which we call the "pure feeling;" that is, the feeling divested of the elements of perception. I have heard a suffering child say of some pain: "I don't like it; take it away!" and this exactly expresses the mental fact of which we are speaking. The degree of aversion may be altogether out of proportion to the apparent importance of the presentation or its physical cause. The irritation set up by some minute injury to an unimportant nerve supplied

to a tooth may produce an intolerable degree of pain. Besides the physical facts of injury to the nerve there are two separate mental facts to be noticed: one is the *sensation*, the other the *feeling*. The sensation may be present in such a low degree of intensity as to cause no pain, although it is quite distinguishable as the same kind of sensation as we ordinarily call toothache. This is a by no means infrequent experience. A particular kind of sensation or elementary percept attracts our attention; we locate it in a front tooth, and say to ourselves, "I hope that does not mean toothache." It is not toothache yet, and the aversion or dislike, the pure feeling of pain has not at present been aroused. If the sensation grows more intense, this feeling is aroused; and the two blend together and are spoken of as one thing—"a pain in the tooth." But psychologically the two are distinct. Physiological research suggests the existence of distinct nerves which convey the sensation of injury; or, to speak more exactly, which convey the physical changes that produce the change in the brain on which the sensation of organic injury depends. But the feeling of pain proper appears to be dependent on the general condition of the organism. In operations under chloroform or other anæsthetics, sensations of contact are sometimes perceived without any attendant pain being felt. The patient forgets this when he awakes, although he is sometimes able to speak of them during the progress of the operation. Thus Dr. Ritchie records the case of a woman who was aware of the contact of the scissors in a

severe operation, and distinguished the four separate incisions it was necessary to make, and who yet felt no pain. Another, when a feather was passed beneath his nose, said, "Don't tickle me," at the moment when the large arteries were being tied, the most painful part of the operation. Careful introspection will make this clear even in the case of bodily sensations; in the case of the æsthetic and moral pains, the pure feeling is still more easy to distinguish from the presentation which causes it. If you see a hideously ugly dress you can at once distinguish between the percept and the feeling.

The state we usually call pleasure or joy or delight, it must be remembered, is not usually one in which the sole emotional element is pure feeling. With this there goes something of the other element of which we have yet to speak. In other words, the term "pleasure," like "pain," is ambiguous. It includes pure feeling of liking or disliking, *plus* a certain degree of sensation fully or partly conscious.

It would seem that every idea affects us, or tends to affect us, with some degree of liking or disliking. The purely intellectual idea is only an abstraction. Some degree of feeling can always, or nearly always, be detected in the normal consciousness. Of course, when we isolate and distort portions of our train of consciousness for the purposes of observation the affective element may become obscured; but in actual life some degree of desire or aversion seems to belong to every idea, whether percept or image. If we contemplate a mass of objects, some

attract us more than others. Wherever we find rivalry, we have our favourites. When we see a number of men contending for a prize, we want one to win. Earnest contemplation of an image makes us long for it to become a reality. The man who, in shaving, thinks about cutting himself, begins to form the nascent wish to cut himself; the man who, standing on a tower, thinks of falling, begins to want to throw himself over. And so with other harmful as well as serviceable ideas. Nervous people near a cannon about to be fired, although they dread its explosion, yet find themselves wishing for it to go off simply because the idea has presented itself so clearly to them. If we suggest an idea to a person in the hypnotic trance, he at once proceeds to try to realize it.

Bodily Disturbances in Emotion.

Let us now turn our attention to this other element of emotion, the mass of bodily sensations which arise from, and which are at once the cause and the effect of, a number of bodily changes.

It has been usual to make an emphatic distinction between an emotion and its bodily expression. We all know that we often have a feeling which we do not clearly express, and that we sometimes express feelings which we do not actually possess. In fact, in only the youngest children do we find the emotion and its expression exactly proportioned to each other. We soon learn to conceal and to feign; and, deceitful as it

looks at first sight, we must see on reflection that social intercourse is only possible on this condition. If every passing feeling were allowed to display itself, society would become impossible. The professional actor is an evidence to what a high degree of perfection the dissociation of emotion and its expression may be carried. We see him apparently suffering, and we weep in sympathy; we see him apparently overwhelmed with triumphant joy, and we cannot refrain from laughter. And yet we must believe that the suffering and the joy on this, let us say, five-hundredth night of the performance cannot be very real; and if we saw him in his dressing-room a few minutes after, we should in most cases have ample evidence of the truth of our inference.

A closer attention to the facts of the case shows us, however, that the line between the expression and the feeling cannot be drawn quite so sharply as we think. It cannot have escaped notice that if we begin to express an emotion the emotion itself begins to take possession of us. If we double our fists and knit our brows, the tone of feeling becomes more earnest, resolute, and even fierce. If we loll with open hands and placid face, we cannot feel heroic or even decided. When we want to get rid of an angry feeling, we can often do so by suppressing all external expression of it. Let us walk up to the person towards whom we feel quarrelsome, and enter into cheerful and amiable conversation with him, and the evil spirit at once begins to disappear. Pious writers on the devout life have recognized

the value of this remedy against anger, and recommend their disciples who wish to avoid it to practice gentleness and sedateness of manner in all their intercourse with others, and even with regard to themselves. It is impossible for some to remain absolute doubters of religion when on their knees in the attitude of prayer. Pascal advises the sceptic to follow the example of others who have passed from doubt to faith, by "making believe that they believed," by taking the holy water, and conforming to the outward demands of the Catholic religion. The man who kneels down and says his prayers cannot be in the same emotional condition as the man who stands in a stiff attitude of protest and defiance. Hypnotic experiments confirm the belief. If they are made to kneel with their hands folded and their faces raised, the patients sometimes become prayerful; if their fists are doubled and they are put in fighting posture, they sometimes become angry and pugnacious.

Then, again, some of the actors, of whom we have been speaking assure us that, as a matter of fact, they *do* feel, at least to an appreciable degree, the emotions whose expression they simulate. Mere facial mimicry can take place without any corresponding emotion being aroused, but when the actor throws himself thoroughly into a great emotional part, like that of Othello, the general consensus of opinion amongst actors appears to be that actual emotion is felt.

Direct attention to our own consciousness (introspection) when we are greatly moved will demonstrate the same thing. We have, most of

us, experieneed the strange thrill that goes down the back when we hear of some great deed of patriotism or self-saerifiee, or when we listen to martial music. The ereeping sensation in the roots of the hair, the aching of the toes and fingers, and the blanching of the faee which affeet us during the narration of some terrible adventure are at onee evidence of bodily changes, and part of the eomposite state which we call the emotion itself. As Professor James says: "If we faney some strange emotion, and then try to abstract from our eonseiousness of it all the feelings of its bodily symptoms, we find we have nothing left behind." This is true in the main, though not quite. There is something left behind, viz., the eonseiousness of liking or disliking—what we have ealled the "pure feeling" of pleasure or pain. But overlooking this, we may accept Professor James's statement. "What kind of an emotion of fear would be left if the feeling neither of quiekened heart-beats nor of shallow breathing, neither of trembling lips nor of weakened limbs, neither of goose-flesh nor of visecral stirrings were present, it is quite impossible for one to think. Can one faney the state of rage and pieture no ebullition in the ehest, no flashing of the face, no dilatation of the nostrils, no elenehing of the teeth, no impulse to vigorous aetion, but in their stead limp muscles, calm breathing, and a plaeid faee? The present writer, for one, eertainly cannot. The rage is as eompletely evaporated as the sensation of its so-ealled manifestations, and the only thing that ean possibly be supposed to take its plaee is some cold-blooded and dispassionate

judicial sentence, confined entirely to the intellectual realm, to the effect that a certain person or persons merit chastisement for their sins. In like manner of grief: what would it be without its tears, its sobs, its suffocation of the heart, its pang in the breast-bone? A feelingless cognition that certain circumstances are deplorable and nothing more."

Additional evidence in favour of this view is found in the fact that when persons suffer from diminished bodily sensibility their capacity for emotion appears to be also lessened. The more completely general sensibility (called *cœnæsthesis*) is abolished, the less, it would seem, remains of the capacity for emotion. This has been shown to be true in some cases where the insensibility is due to disease, and also when it has been artificially produced by hypnotism. In spite of some observations which point to the opposite direction, it seems probable that Dr. P. Sollier's conclusions will be substantiated, viz., that the suppression of the general sensibility of the body involves a proportional suppression of capacity for emotion, so that at last only the capacity for a purely intellectual state remains. Dr. Sollier considers that the sensations derived from the internal organs are much more important in this reference than those arising from the surface of the body, or from the movements of the limbs. It is the sensations which arise from the breast and lungs and organs of digestion, rather than those of the special senses or of the motor apparatus, which form the "body" of the emotion. If this is correct, we can understand why an

actor may imitate the external signs of emotion without feeling it. He can, to a large extent, dissociate these from the visceral changes which usually accompany them; and so far he can mimic without feeling. If he *feels* the emotions, this must be because he has not completely dissociated the two sets of bodily changes, the internal and diffused disturbances of heart, lungs, bowels, etc., on the one hand, and of the special muscles concerned with facial expression and the movements of the limbs on the other.

The More Refined Emotions.

If there be any exception to this view, that emotion consists in great part of conscious or not-so-conscious organic sensations, it is found in the region of the more abstract forms of feeling usually called *sentiments*. Even Dr. James hesitates to push his view to its extreme extent in reference to those. He allows that in æsthetic emotion, for instance, there is an element not due to organic sensations. There is a direct pleasure derived from the visual percepts or the auditory percepts. Certain arrangements of colours and lines, or of tones, give us pleasure directly and of themselves, independently of any "repercussion backwards of other sensations elsewhere consecutively aroused"; that is, of any sensations arising from disturbances in the heart, lungs, digestive organs, skin, and so forth. These latter follow and confuse themselves with the former. But the former can exist without them. "In every art there is the keen percep-

tion of certain relations being *right* or not, and there is the emotional flush and thrill consequent thereupon" (James). To some extent what we call classical and romantic art are distinguished by the relative importance of the primary and the secondary kinds of emotion: that which follows at once from the perception and that which follows more remotely from the effects of the diffused wave of nervous disturbance. Romantic art depends largely on suggestion, arousing a great mass of more or less indefinite feelings. Classic art relies for its effect on the pleasure derived from simple arrangement of colour and line. The pleasure of the expert is of this kind—the "primary emotion," as James calls it. He further says: "Where long familiarity with a certain class of effect, even an æsthetic one, has blended mere emotional excitability as much as it has sharpened taste and judgment, we do get the intellectual emotion, if such it can be called, pure and undefiled. And the dryness of it, the paleness, the absence of all glow, as it may exist in a thoroughly expert critic's mind, not only shows us what an altogether different thing it is from the 'coarser' emotions we consider first, but makes us suspect that almost the entire difference lies in the fact that the bodily sounding-board, vibrating in the one case, is in the other mute."

It seems to me very doubtful whether we can make the exception that James is willing to make. In the extreme case—in the limit, as mathematicians would say—emotion quite disappears, and we have no feeling at all. We know that, as

a matter of fact, no human state of mind is so simple as this. There is always some element of feeling. It is perhaps conceivable that this element may be pure feeling, mere pleasure and pain, mere liking or disliking. But we know that this feeling is never, so far as introspection shows, absolutely calm; that it always tends to excite and stimulate the bodily organs. If A is always accompanied by B, and B, so far as we can see, always by C, then we may assume that where A is C will be. We may fairly assume, then, that where perception or imagination occurs it will be accompanied by some diffused feeling, however slight, and this diffused feeling means in the long run conscious or subconscious organic sensation.

The Expression of Emotion.

But it may be objected:—Does not emotion grow with the suppression of its outward manifestations? How, then, can you make out that emotion *is* simply the consciousness of its manifestations? In reply to this we may say, first, that emotion does not consist simply of its organic disturbances; that in an emotional state we have always some idea (percept, or image, or concept), and some degree of pure feeling (pleasure or pain). In the next place, to suppress the outward manifestations is not to suppress all the bodily changes which form the characteristic quality of the emotion. We said that internal changes are probably of more importance than external. It is the sensations we derive

from the organs of life, from the hidden bones and the partially hidden skin, more than those we derive from the muscles of the face and limbs, which are important. To suppress the latter may very likely lead—in most cases must lead—to the increase of the former. In fact, the case is something like that of an actor. The more restricted discharge of nervous energy may be more or less turned on or off as we like, if we will only take the trouble to learn to manage the taps; but the more diffused parts of the flow is, to a large extent, out of our control. Where the muscular, facial and other movements, which constitute what we call expression and gesture, are the most important, to suppress them means almost necessarily to suppress the emotion; to set them going means almost necessarily to start the emotion. But where there is great "bodily resonance" as well, we may suppress the more obvious manifestations without diminishing, and if our mind is still allowed to dwell on the exciting cause, even with the effect of increasing, the emotional disturbance.

We now see that the expression of emotion must be essentially a matter of instinct; that is, of untaught ability. We have to learn how to express our thoughts by means of spoken language or some equivalent, and the process of learning takes several years. Not so with our emotions. Here the expression is, so to speak, part of the state expressed; if we did not smile, we should not be happy; if we did not tremble and feel weak about the knees, we should not fear. An essential part of the total mental condition we

call fear consists in the vaguely perceived organic sensations arising from the bodily organs affected. They are partly conscious, partly sub-conscious (or marginal) percepts; very indefinite and confused, and very imperfectly localized. But they belong to the class of presentations or ideas, and not to the phenomena of pure feeling or desire. If these vague ideas were not present there would be no real emotion, at any rate, only a mere feeling of attraction or of shrinking without definite quality. Directly such definite quality becomes present, we still find bodily manifestations if we look attentively. These may be wholly internal at first, but very soon external signs will be added. In one case reported, the first true smile was observed about the forty-fifth day after the birth of the child; Darwin thinks the smile appears between the eighth and tenth week. Fear was first shown by different children at twenty-three days, two months, and four months respectively; anger at two months and ten months; and sympathetic affection at the age of from nine to twelve months.[1]

Like other instincts, the expressive movements of emotion are practically uniform among all races of men. How were they originally acquired?

Origin of Forms of Emotional Expression.

The answer is not to be found in psychology alone, but partly in physiology. There is every

[1] Authorities for these dates are Darwin, Perez, Preyer, and Sully.

reason to believe that when a disturbance is set up in any part of the nervous system it tends to spread into other parts of the system. Sometimes the disturbance is highly localized; and this seems to be the case with these changes in the substance of the brain which accompany thought—that is, the purely intellectual operations—when we think the nerve cells and fibres in only a small area of the brain are affected; but more usually the nervous discharge passes along the nerves which run outward from the brain, and produces, in addition to the central disturbance connected with thought, changes in the voluntary muscles and in the organs of life. When the outgoing discharge is small, the small muscles only are moved, and those which are attached to and have to move the smallest weights. Thus when we are slightly pleased, the small muscles which cause the wrinkles at the corners of the eyes, and those which pucker the mouth into smiles, are affected; if the disturbance increases, the other muscles of the face are brought into play, and the smile broadens into a grin. The muscles which support the head become invaded, and the head rolls about. Finally the whole body becomes convulsed, and we "laugh till we cannot stand." A similar progress in the size and importance of the muscles affected will be found to hold good in the case of other emotions. Even in the case of the lower animals the same thing occurs. The dog begins to manifest his joy by gently waving his tail, and finishes by throwing his whole body into a series of flexible curves. When a little angry, his tail at first becomes stiff, and the corners

of his upper lip are drawn back. Then he walks stiffly, and soon he becomes entirely rigid with hair erect, all his teeth showing, and every muscle tense. We may lay down, then, as generally true, with regard to this diffused nervous discharge, that "other things equal it affects muscles in the inverse order of their sizes and the weights of parts to which they are attached, and by so doing yields an additional indication of its quantity" (Spencer). What becomes of such a diffused discharge of nervous energy? It cannot go on for ever; and it may terminate in one of several ways. It sometimes dies away because the central disturbance has come to an end, and there is no further supply to keep up the excitement in the outgoing nerves. If it does not come to an end in this fashion, but the cause continues, it is cut short by the disturbance it creates in the organ of respiration and circulation. The blood supply is affected, imperfectly oxygenated blood is sent from the lungs which have ceased to attend to their proper work, and this imperfectly oxygenated blood is pumped along irregularly and inefficiently. We become weak and fatigued as though after violent labour. Thus the excess of emotion brings about its own cessation. Sometimes, indeed, the physiological effects are so intense as to cause death. It is well known that excessive joy or grief, fear or anger, may be fatal.

Serviceable Associated Habits.

Besides the diffused discharge which tends to invade the whole system, so that all emotions

are found to cause changes, or be accompanied by disorder, in the functions of the heart, lungs, etc., there are more restricted discharges, which vary from one emotion to another; or rather, a portion, of the nervous discharge, sent out by the brain, is directed to special groups of muscles which differ according to the emotion felt. We find that different muscles are involved in smiling and in frowning, in the expression of fear and of contempt. How has it come about that a particular set of muscular contractions accompanies one feeling, while another set accompanies another feeling? In other words, why do we not smile when we are angry, frown when we are merry, and double our fists when we are in sorrow? The reason, according to Spencer and Darwin, is this: "These external muscular movements which 'express' an emotion are more or less imperfect forms of movements, which originally, in our ancestors, if not ourselves, served to satisfy the emotion." If a man now doubles his fist when he is angry, it is because this movement is a step towards gratifying hatred by attacking the offending object. If he frowns, it is because his early ancestors found themselves at an advantage in fighting when they excluded the sun from their eyes by a similar movement. It will be noticed that such movements, caused, as Spencer would say, by the restricted discharge, are more under our control then those brought about by the general overflow of nervous energy.

A great many emotional movements can be explained by this principle of "serviceable associated habits" which Darwin and Spencer laid down. Let

us state it in the words of the former: "Certain complete actions are of direct or indirect service under certain states of mind, in order to gratify certain sensations, desires, etc.; and whenever the same state of mind is induced, however feebly, there is a tendency, through the force of habit and association, for the same movements to be performed, though they are not of the least use." Spencer brings more clearly before us the part played by Evolution in establishing these connections. He says: "The special effects are partly due to the relations established in the course of evolution between particular feelings and particular sets of muscles habitually brought into play for the satisfaction of them, and partly due to the kindred relations between the muscular actions and the conscious motives existing at the moment." I cannot forbear quoting the following well-known passage from Mr. Spencer as an illustration:—

"If you want to see a distant object in bright sunshine, you are aided by putting your hand above your eyes; and in the tropics this shading of the eyes to gain distinctness of vision is far more needful than here. In the absence of shade yielded by the hand or by a hat, the effort to see clearly in broad sunshine is always accompanied by a contraction of those muscles of the forehead which cause the eyebrows to be lowered and protruded, so making them serve as much as possible the same purpose that the hand serves. . . Now if we bear in mind that during the combats of superior animals, which have various movements of attack and defence, success largely

depends on quickness and clearness of vision, if we remember that the skill of a fencer is shown partly in his power of instantly detecting the sign of a movement about to be made, so that he may be prepared to guard against it or take advantage of it, and that in animals—as for example, in cocks fighting—the intentness with which they watch each other shows how much depends on promptly anticipating one another's motions; it will be manifest that a slight improvement of vision, obtained by keeping the sun's rays out of the eyes, may often be of great importance, and where the combatants are nearly equal, may determine the victory. There is, indeed, no need to infer this *ā priori*, for we have *ā posteriori* proof: in prize-fights it is a recognized disadvantage to have the sun in front. Hence we may infer that during the evolution of those types from which man more immediately inherits, it must have happened that individuals in whom the nervous discharge accompanying the excitement of combat caused an unusual contraction of these corrugating muscles of the forehead, would, other things equal, be the more likely to conquer and to leave posterity—survival of the fittest tending in their posterity to establish and increase this peculiarity. Support for this inference may be found in the fact that the male of the most formidable anthropoid ape, which has canine teeth nearly equal to those of a tiger, with jaws and temporal muscles to match, is remarkable for an enormous supra-orbital ridge of bone, over which, when angry, he is said to draw the hair-covered

skin, so producing a formidable frown—that is, an efficient shade.

"But why should this mark of anger be also a mark of pain, physical or moral? May we not, in reply, say that since pains, physical and moral, are throughout the lives of inferior animals, as well as the life of man, inextricably entangled with the other accompaniments of combats, their physiological effects become entangled with the physiological effects of combat; so that the pain, no less than the anger, comes to excite sundry of those muscular actions, which originally established themselves by conducing to success in combat? The laws of association will, I think, justify this conclusion."

According to this view the modes of expression which accompany a given emotion, say anger, may be extended to a nearly related emotion. This principle has been put forward more definitely by the German psychologist, Wundt. When we feel pleased we exhibit something of the same movements of the mouth as we show when we taste something sweet; when we feel dislike we exhibit some of the movements which accompany the test of what is very sour or bitter. There is a kind of mimicry of the movements whose meaning is already known. We utilize the movements expressive of physical liking or disgust to express purely moral approval or disapproval, because the latter are analogous to the former. Thus we clench our fist when we resolve to make a heroic effort, even if no actual fighting is involved; and we shake our head—that is, turn it from one side

to the other—when we dislike anything we see or imagine, just as a child or a dog does in the presence of something nasty. If you ever watch a dog holding a frog in his mouth you will see the germ of our own human expressions of moral dislike and contempt; the solemn shake of the head and the retracted lips, leaving the side teeth bare, are eloquent of disapproval.

Classification of the Emotions.

The scientific classification of the emotions seems to be a hopeless task. The distinctions we recognize in common speech have been forced on us by practical needs, not from any interest in psychological theory. The psychologist may hold that there is more in common between the higher forms of, let us say, reverence and fear than between the higher and lower forms of fear. But to the plain man the practical considerations are all-important, and he draws rigid lines of separation between reverence and fear, because the actions of men, moved by these two, are so markedly different. The classifications of the psychologists confuse together emotional states which, in ordinary life, we put far apart; and they separate emotional states which, in ordinary life, we regard as closely related.

Thus Mr. Spencer separates the instinctive terror we feel in the presence of an object we do not understand from the terror we feel in the presence of a clearly perceived object, and both from the terror we feel when we recall the such clearly perceived object in memory. The first,

he would tell us, belongs to the great class of *presentative* feelings, the next to the class of *presentative-representative* feelings, and the third to the class of purely *representative* feelings. Most of us would regard them as all three more closely connected than any two kinds of feeling included in any one of these three classes could be.

Fortunately, we may here spare ourselves the task of classification, and content ourselves with recognising a few well-marked groups which have received universal recognition. Such are the following:—

(1) Pleasure, joy, delight, satisfaction, content.
(2) Pain, grief, sorrow, regret.
(3) Fear, terror, horror, anxiety, apprehension, suspicion.
(4) Anger, dislike, hatred, envy, malice, jealousy.
(5) Affection, sympathy, love, benevolence, esteem, respect, veneration.
(6) Pride, vanity, conceit, self-esteem, ambition.
(7) Surprise, wonder, amazement, curiosity, admiration.

It will be seen at once that some of these are much simpler states than others; or at any rate *may* be much simpler. Fear, for instance, can exist as a very elementary feeling in an infant, and so may anger; but suspicion and jealousy are obviously more complex forms, which demand more intellectual development than the infant has reached before they can exist at all. We cannot be suspicious until we have learnt

that what is apparently an object of satisfaction may turn out to be an object of dislike; we cannot be jealous until the emotions accompanying possession have been aroused in us. Such complex emotions might often be classed under several distinct heads, because they are a blend of simpler emotional states. Thus veneration has in it something of the element of surprise, as well as something of the element of affection. Sometimes one aspect seems to predominate, sometimes the other. We cannot get the whole emotion put before us by naming the group to which it belongs. The greatest skill of the novelist lies in his power to describe the exact shades of highly complex emotional states.

Sentiments.

The most complex and abstract group of feelings are those connected with the acquisition of knowledge, the judgment of conduct, the perception of beauty, and the belief in the supernatural. These feelings, with some others, have acquired the name *sentiments*. The name is loosely used, and there is no reason why psychologists should preserve it. The objects which give rise to them are, as a rule, ideal and abstract in character; they involve the possession of more highly-developed intellectual powers than do the instinctive emotions, such as fear or anger. A young child or a savage is incapable of disinterested love of truth, or disinterested moral emotion. Again, such feelings are not, as a rule, accompanied by strong bodily symptoms; the

diffused discharge of nervous power must be smaller than in the less intellectual feelings. These two features are, however, not well marked. Some æsthetic emotion is felt by quite young children, and by savages at the bottom of the scale of humanity. No race of men that we know of is without some delight in dancing, music, poetry, and decorative design. Primitive men in the older Stone Age (palæolithic) engraved hunting scenes on bones and on antlers. Remains of this very early art, found in France, Switzerland, Belgium, and Great Britain, still exist in our museums.[1] In the same way moral and religious emotions, of a sort, are found in the earliest types of humanity to which we have access. It is evident, then, that the sentiments are not marked off clearly in this respect from the more instinctive and less ideal types of emotion. At most, all we can say is that they can exist in a highly abstract form only in minds that have reached a relatively high degree of development. Then, again, with regard to the other characteristic of the sentiments, absence of marked bodily changes, we find that certain forms of moral feeling, of religious feeling, and even of æsthetic feeling, are characterized by very considerable muscular and visceral disturbance. The hearts of disciples "burn within them"; passionate prostration and fiery indignation, accompanied by disorder in the circulation and respiration, by paleness or blushing, and other signs of extensive physiological upset, are found

[1] The reader who wishes to learn more of it may consult Mr. Clodd's *Story of Primitive Man.*

in men devoted to great causes and lofty ideals. The fanatic is usually a man moved by religious or moral feeling; and he is by no means notable for calm. We do not look for quiet refinement and aloofness in the artist, the saint, or the moral reformer. On the other hand, fear or hatred may take a form in which we find little trace of bodily excitement. It seems, then, a mistake to attempt to discriminate a special group of sentiments, since the calm, abstract form of emotion which we usually call by the name is, after all, only an imperfectly marked phase of certain complex feelings. Nearly all feelings may take a relatively calm form in which there is little bodily disturbance, and in which the object has become little more than an abstraction. Thus the calm, settled contempt for the ordinary aims and conditions of life, which we call cynicism, is as much a sentiment as the love of beauty or the love of God.

Species of Feeling not clearly marked off.

The truth is that no forms of feeling are clearly marked off from each other. The attempt to analyse them from the psychological side is so difficult that some psychologists have preferred to approach them from the physiological point of view, and have endeavoured to discriminate them, not by their intellectual causes or their qualities as conscious states, but by their bodily accompaniments, which, as we have seen, are also the causes and sources of their characteristics as

mental states. It cannot be said, however, that any such attempt has been a success.

Every emotion is a highly complex state of consciousness, involving intellectual elements (at least a perception, an image, or an abstract concept), a tone of pure feeling (pleasure or pain, liking or aversion), and an indefinite mass of conscious and subconscious organic sensations derived from the muscles and other organs affected by the diffused nervous excitement. Even the simplest emotion of joy or sorrow has these. The more complex have several, or many, of each. In an emotion like that of sympathy for others in distress there are scores of separate elements, which can be more or less definitely distinguished by introspection and physiological observation. Nearly all of these elements form part of other emotions, and no clear lines can be drawn where one begins and and another leaves off. Parental feeling, sexual feeling, enjoyment of mere sensations of contact, enjoyment of pleasures of converse, æsthetic feeling, pride, delight in possession, sympathy, or the direct sharing of the feelings of others, anxiety for the well-being of others, anxiety for one's own interest, jealousy, pity, admiration, and a dozen other simpler forms of feeling can be detected in a well-developed emotion of "love," such as is felt by a typical Englishman for a typical Englishwoman. Each of these elements has its general and particular bodily characteristic —the physiological changes which have been so often spoken of in this chapter. And each has its special tone of pleasure or pain, so that the

whole emotion is neither absolutely pleasant nor absolutely painful, though no doubt the pleasure predominates with all but the most unfortunate of lovers.

The same thing is true of nearly all the other emotions as we find them experienced by highly-civilized adults. We see that it is impossible to draw lines of division. We do not find, as in the case of natural objects, a number of well-defined classes, in some sense "made by Nature," owing to the action of the same causes over untold lengths of time. We find a practically infinite variety of emotions, varying from race to race, from man to man, and even from year to year in the same man. There are few intermediate forms in Nature; species are on the whole fixed, and they are distinguished from each other, as Mill puts it, by "an indeterminate multitude of properties," which remain constant and unchanged. On the other hand, "there is no limit," as James says, "to the number of possible different emotions which may exist." Nothing more, therefore, than a rough classification, made for purely practical purposes, is possible. Every attempt at a scientific classification must fail to cope with the enormous mass of varieties.

Importance of Feeling.

Whatever feeling is, it is of vast importance in our mental life. Thoughtful people get too much in the habit of thinking that intellect is everything. Yet the world is governed not by thought, but by emotion. The motive impulses

are not usually ideas, but feelings; and the particular ideas to which the feelings attach themselves are determined almost by accident. Ambition, anger, lust, love, reverence, conscience, and so on, have different objects according to age, sex, history, and so forth. But they are the same fundamental passions.

Even in abstract thought emotion bears a great part. A man becomes a philosopher or an experimenter because curiosity, love of consistency, impatience of inconsistency, and reverence for truth are dominant in his character; and of course his work increases the intensity and predominating influence of these modes of feeling. Keenness of logical faculty no more makes a great man of science than does keenness of sight or hearing. The most acute reasoners often fail because their splendid machinery has no motive force behind it. A man of science is something more than a clever barrister, with a finely-constructed apparatus for arriving at conclusions from facts; and it is very largely his specific emotional nature which makes the difference. He cannot bear to have a flaw in his theory, even if no one but himself sees the flaw. He cannot bear to know that there are facts which his hypothesis ought to account for, but cannot be made to account for. He is always asking himself, "Am I certain that I arrived at that conclusion legitimately? Was the fact as I thought it to be?" He never, like other men, flags in his capacity for wonder and for curiosity. The plain man soon gets satisfied. He sees nothing to wonder at in this or that familiar fact. For him mere use and

wont is sufficient to dull all interest. It is the capacity for wonder that marks off the scientific man, perhaps more than anything else. The most commonplace fact arouses his attention, and suggests a question. Then comes an irresistible desire to solve this question. The fact, brought into unexpected relation with some previously unconnected notion, stands out as an apparent exception. The apple falls; Newton asks, Why? But the average man pockets the ribstone pippin, and says no more about it.

CHAPTER VII

MOVEMENT AND WILL

MOVEMENT we are familiar with as one of the most persistent features in animal life. Nearly all animals move of themselves; that is, their movements originate, as a rule, from within. Dead things and plants may be moved, but with a few striking exceptions (*e.g.*, the sensitive plants) they do not move of themselves. Most animals do; but we recognise considerable differences in these animal movements.

Some are, so to speak, *mechanical*. They belong to the organs on which life depends, and cannot come under control of the will, except in abnormal circumstances and for a short time. Such are the movements of the heart, lungs, and other organs. In their origin they are quite independent of consciousness, and seldom give rise to percepts unless disturbed. It does not follow,

however, that they are absolutely unnoticed; some trace in consciousness they certainly seem to have. Others, called *spontaneous or random movements*, seem to originate within the body without any external cause, but are not necessary to continuance of life. Others, again, are due to the occurrence of some external stimulus, and are performed instantly and without hesitation.

Reflex Movements.

If we touch the eye of a snail at the end of its long stalk, the eye is instantly drawn back much in the same fashion as the leaf of a sensitive plant when we touch it. If we turn a strong ray of light on the eye of a person the iris inevitably contracts as long as the apparatus is sound. Such actions are called *reflex*. They may take place without any clear sensation whatever arising. Closely allied to them, and difficult to be distinguished from them, are those actions (also called reflex) in which there is present a sensation that is an elementary percept not necessarily referred to any external object. In this last class we may place the sudden turning of the head when a noise is heard, and the grasping by a newly-born infant of anything placed in its palm. Both these classes are reflex, but the former involves less consciousness than the latter.

Instinctive Movements.

Instinctive movements are more complex than

mere reflex movements; they are accompanied by more consciousness, and the sensations which originate them are accompanied by feelings of pleasure or pain. We have here an element of *impulse;* a liking or disliking of the present state, and a tendency to continue it or put an end to it accordingly. To this class belong a large number of ordinary human movements, as well as many of them performed by the lower animals. The sucking of the babe at the breast is a simple instance; the very complex series of actions concerned in nest-building is a more elaborate one. Many of the external movements expressive of emotion belong to this class; for instance, smiling when pleased and clenching the fist when angry.

Purposive Movements.

Purposive movements involve a still higher degree of consciousness; besides the occurrence of a sensation or percept, there is aroused the image of a movement. This engages the attention as well as the percept. "Suppose I am hungry, and see a supply of food. The idea [percept] of the food possesses me, holds my attention. At the same time that I have this idea I have the further idea [image] of a movement towards the food and of its seizure. That is to say, the sight of the food brings up in my mind [subconscious] memories of all the organic and other sensations which would be aroused by a real movement towards the food. The attention is now directed, not upon the idea of the food, but upon the idea

of the food *plus* the idea of my own movement. Attention to this pleasurably-toned compound idea is the psychological condition of actual movement; my hand goes out towards the plate, and the sensations which I had imagined are realized" (Titchener).[1] This is a very simple case of purposive movement; in more complex cases we have a choice of acts. But it will serve as a type of the kind of movement to which what we call voluntary movement belongs.

There is always present a conscious recognition of an end to be attained, and a recognition perhaps less clear of the nature of the movement by which this end can be attained. This involves *attention* to both object and movement. Further, there is some degree of *feeling*, some amount of pleasure in anticipating the end, and of uneasiness in so far as the attainment is hindered. And last, there is usually present an element of *choice*, which may be merely between action and inaction, or may be also (as just now said) between the acts which come into our consciousness as necessary to reach it. This element of choice must not be overlooked. In the lower kinds of purposive action — that is, those which most nearly approach impulsive action—the element of choice is not very clear; and it may perhaps be entirely absent. Some acts done by hypnotic patients, even after they have actually been awakened from the trance, appear to be lacking in the element of choice. But this is seldom the case.

[1] The words in square brackets are not in the original. I ought to add that Dr. Titchener calls these simple purposive movements "impulsive."

Origin of Purposive Action.

How do we come to be able to perform a certain act on the occurrence of certain presentation?

If the act has often been performed before the matter is easy enough to understand; and it is highly probable that all reflex acts were originally voluntary. The difficulty is to see how, on the first occurrence of a certain stimulus, a child is able to make an appropriate movement. Wundt finds the beginning of voluntary action in acts of an impulsive character. Professor Ward is inclined to find it in *aversive* movements, and secondarily in other movements immediately expressive of feeling. A movement which carries away a limb from a painful stimulus is continued. The transition from painful feeling to pleasurable feeling increases attention. The motor sensations involved in the movement are remembered because of the pain and its cessation. The anticipation of a similar painful experience will be likely to lead to a repetition of the movement; for the mental image of the circumstances arouses a mental image of the movement, a visual picture of the moving limb, strengthened and enriched by recalled muscular and joint sensations. In the same way when a pleasurable stimulus is found to be increased by a movement, the movement and the stimulus become associated; and the stimulus is likely to lead to a reproduction of the movement.

But how is it that the occurrence of an idea of

movement leads to the actual execution of the movement? We know that the mere thinking of a movement does not always and necessarily involve the execution of the movement. I can picture my right foot kicking without actually kicking; and if my right side were paralysed the picture would never lead to the reality. Yet it is true that the occurrence of a motor image, containing as it does elements derived not only from sight but from muscles, joints, etc., *tends to produce the movement itself*. The division which we make between thoughts and movements, the intellectual and the conative sides of mind, is not so absolute as we think it All states of consciousness have a motor side. Movement is the natural result of feeling. This is involved in the very statement that all ideas have a pleasure-pain quality. Pure feeling means inclination to and aversion from; and this inclination or aversion is to be regarded as the mental correlative of a nascent movement. It does not matter whether we say that every idea is accompanied by some feeling and every feeling is a mental accompaniment of the beginning of a movement, or whether we say that every idea tends to produce movement. What are called *fixed ideas* give us an extreme example of the tendency; but the tendency is always present. The somnambulist who acts out the motor images of his dream, the hypnotized patient who, when told he is a soldier, uses a walking-stick like a rifle, the excitable woman who tries to throw herself off a tower because the image of herself falling has taken possession of her, are instances. The

"thought-reader" is able to utilize the tendency, and by surrendering himself to the guidance of the involuntary muscular movements made by his conductors, he is led by them to the object of which they are thinking. Careful observation and introspection assure us that during trains of thought there is a constant tendency to movement of the vocal organs. Many of us habitually make actual movements of lips and tongue when we think; the rest only do so occasionally. There can be no doubt that during thought the organs of speech are in a state of innervation. They are the recipients of nervous energy, and the movements though not actual are nascent. When we watch a man learning the bicycle we are liable to make the same movements of recovery that he does. As we look on at a game we sometimes find ourselves imitating the players. The motor percepts and images are direct causes of movements although we do not wish to make them, and know that they only make us look ridiculous.

Ideas, then, tend to act themselves out. And this tendency is made in proportion to the attention we pay to them. Every idea would result in action if it were not for the rivalry of other ideas.

Internal Struggle and Control.

When we dwell on the image of a movement, and further wish the movement to take place, because it will secure us something we want, the idea of the movement becomes so vivid that actual

movement takes place, provided always, *first*, that the physiological machinery is in working order; and *secondly*, that there are no rival ideas suggesting quiescence or contradictory movements.

If a child sees a peach on the table and is desperately thirsty, and fully realizes the delight to be got from the peach, he will inevitably make the appropriate movement of seizure, unless the image of a scolding, and perhaps worse, occurs to him, or the thought of the eighth commandment, and the dreadful consequences which his teachers assure him will result from his breaking it, or perhaps the image of his invalid sister, for whom the peach is intended. If one or more of such rival ideas present themselves, they will restrain the movement suggested by the idea of appropriating the fruit. For a time the child is torn by conflicting wishes. He wants the fruit, but he does not want to offend his mother or to offend God; he does not want to deprive his sister of what she likes. The victory for one or other course, appropriation or abstention, will be determined under normal circumstances by the way in which the attention of the child is held. If his social instincts are strong, if he hates to see his mother angry with him and if he loves to see his sister pleased, he will restrain his appetite for peaches, and the movement will not take place. Images of his angry parent or his delighted sister will fill his mind, and the actual presence of the peach will be less stimulating than these pictures of what may be in the future. The image will become dominant. He will withdraw his eyes and get away from the

room. But if his imagination is weak and his sympathies dull, these pictures will be elbowed out by the percept of the peach, and the vivid image (supported and made intense by the percept) of himself eating the peach. This last will claim all his attention, and the movement of appropriation will be made.

Self.

In the adult this struggle will be complicated by the presence of the concept of *Self*. During childhood and youth there grows up in our minds an idea of our *self*, as a being having a certain history and a more or less definite character. Based largely on organic sensations, such as those spoken of at the end of Chapter IV., but embodying many other elements of thought and feeling, this concept exercises a very important influence on our actions. We come to know it, to talk of it, to reverence it, and to seek to modify it. In part it is what we mean by *character;* though it is more than this. In all cases of rivalry of impulses the idea of self comes in. The struggle is no longer, as in a very young child, a mere oscillation between opposing impulses. Our whole mind, with its recollections and anticipations, its organized likes and dislikes, its systematized knowledge of life, and its knowledge of self, is involved. The child's idea of self is a poor affair, without substance enough to be of much influence in the rivalry of ideas. The adult's idea of self links together the whole of his past and future. Is this act, this peach

stealing, this gain of momentary pleasure at the expense of my own future and the happiness of others, compatible with my own character? Will it fit into my own notion of what I am, and of what I am wishing to become? What Adam Smith somewhat quaintly calls "the love of the grandeur and dignity and superiority of our own character" becomes in adult life a motive idea of extraordinary power. It makes us not only refrain from pleasure, but prompts us to active self-sacrifice. In this wider self, partly identified with, and partly discriminated from, the social environment—the conscious selves of others—our conscious life reaches its highest development.

Habit.

When an act has been often performed under similar circumstances there usually grows up a tendency for it to be performed again in the same way under the same circumstances. This is a *habit.* Thus if a man shaves every morning for many years there grows up a tendency for the action to be performed, and to be performed in the same way. The young man who begins to shave himself does it irregularly, sometimes in the morning, sometimes in the evening, now before dressing, now after dressing, occasionally he omits it for a day or two. The old man does it with slavish regularity as to time, order of operations, and so on. Consequently he does it with less attention to details than the beginner. Where such attention is aroused it often leads him to disaster.

Few men strop their razor so well or shave themselves so well, if they think too much about it. Where the habit is interfered with, so that the act cannot be performed, a great or less degree of discomfort is aroused. The formation of regular habits involves, therefore, an enormous saving in attention, time, and effort. Let us compare the first faltering efforts of a child learning to walk or talk with his ready performance after the action has become habitual; or, perhaps more striking still, the efforts of a person learning to use a typewriter, or play the piano, or ride a bicycle, with those of the same person when he has acquired the habit. The constant effort of attention, the ineffective attempts to realize what movement is wanted, and the still more ineffective attempts to perform it, the miserably slow progress, the irksomeness and fatigue of it all, are in extraordinary contrast with the ease, speed, certainty, and regularity with which he afterwards executes the necessary movements. If this power of acquiring habits did not exist, all progress would be impossible. Fresh acquirements are only possible because what we have already acquired has become habitual. If it took us as much effort to walk and read as it did when we began, we should never be able to learn to do anything else. Those two difficulties would suffice to occupy us all our lives. Everything that seems so much a matter of course to us now would involve a world of difficulty and anxious thought. We should take half the day to get up and dress ourselves, and the other half would barely see us through breakfast. There is no

need to choose by what series of acts I shall dress, whether the bath shall precede or follow shaving, and in what order I shall put on my clothes. By the blessed influence of habit we can spare our efforts for dealing with new difficulties; the old have solved themselves.

We may express this by saying that through the influence of habit all purposive or voluntary acts tend to become *automatic;* to become fixed, mechanical, and unconscious. In fact, the eighteenth-century psychologist, Hartley, called habitual action "secondarily automatic" and the name is still sometimes used.

Some psychologists, following Lamarck, have maintained that all instinctive actions are in like manner degraded forms of fully purposive actions. Some of them, (*e.g.*, Wundt, Ward, Titchener) indeed maintain that even *reflex* actions were once performed with full consciousness; that the movements of the iris by which the eye is accommodated to the degree of light which falls upon it, or the movements of the throat by which we swallow food, are in the strict sense secondarily automatic actions. According to this view all the instinctive and reflex acts of both man and the lower animals were once purposive. They stand upon quite a different level from the movements of the heart and lungs, although now some of them may be performed with just as little consciousness. The pleasure which accompanied them has disappeared. There is no longer any deliberate adjustment of movement to end. But in our remote ancestors there was both pleasure and adjustment. Primi-

tive men learnt with difficulty, it may be, to walk upright, and what they acquired has somehow or other been passed on to us, so that the modern human baby learns the habit much more easily. Our pre-human ancestors, perhaps far down the scale of quadrupeds, acquired the habit of winking when an object was seen approaching the eye; therefore by inheritance the human baby is able to do this from the first, and the act is in the strict sense reflex. In the case of winking the mechanism has been perfected in the dim past of the world's history; in the case of walking it has not been finally completed and needs a certain amount of individual experience. Either in my own experience or in that of my ancestors, human or pre-human, not only my instinctive actions but even my reflex movements have been slowly developed from actions originally more or less purposive, that is involving an element of effort; they were once conscious attempts to perform an action which should achieve a pictured end.

This theory is certainly rather startling; but in its favour we have the fact that we see in our daily life that actions once completely voluntary may become automatic, as already explained. Further, there is the fact that, as far as we can judge, the movements of the lower animals are not of the nature of reflex acts, but usually involve an element of choice. Of whatever nature may be the consciousness of, say, a fish, it is impossible for an angler to doubt that its movements are accompanied by consciousness of some kind. They are scarcely ever purely

mechanical; the uniformity, precision, certainty of the machine are strikingly absent. Instead of these we find constant irregularity and hesitancy. The fish learn before your very eyes. Every kitchenmaid knows that black-beetles cannot be caught indefinitely with the same traps or poisons. For a few nights there is terrible havoc, and the wildest hopes are raised. But a week later, though many of the pests are still seen, the tale of victims drops to one or two a night. There has been no time for the action of natural selection or heredity, or any other refuge of the scientifically distressed. What can it be but choice? Even the lowest forms of life show it; the movements of even the amœba are strikingly suggestive of it. And there is a third argument for the doctrine that our automatic actions are degraded forms of actions once purposive. As we saw in the last chapter, many actions used in the expression of emotion are actions which were once serviceable to an end—for pursuit, defence, and so on. There can be no practical doubt that when a baby clenches its hand during a fit of anger, this is because its ancestors used their fists for offence.

The utility of the action shows it must once have had a purpose; that it was consciously executed for a consciously pictured end. So with the knitting of the brows, the dilating of the nostrils, and so on. If this is so, why may we not infer that the reflex actions, which show a similar degree of adaptation to some useful end, have likewise originated in conscious purposive movements?

In a normal human being, then, we find (putting aside the mechanical internal movements of the heart, etc.) reflex actions, instinctive actions, and purposive actions. Of these, the reflexes are no longer of much interest to us as students of the mind, except on account of their probable origin. As activities of living tissue unaccompanied by consciousness, they belong rather to physiology than psychology. Instinctive actions are of great importance, especially in the lower animals. We have every reason to believe that many, if not most, of the actions of insects, crustaceans, and the lower vertebrates, are performed more or less automatically, althoug they are doubtless accompanied by some degree of consciousness. Instinct means untaught ability; and while certain purely mental abilities are often called instinctive, the name in its stricter signification signifies the inherited capacity to perform bodily movements without individual experience or instruction. Viewed apart from the question of its origin, instinctive action means highly complex reflex action, accompanied by consciousness.

Instincts of the Lower Animals.

The most interesting cases of instinct are, of course, found among the lower animals. We must not assume that man is without instincts, but in him they are stunted and overlaid by the new habits acquired by each individual. Our instincts are indeed probably to a large extent the remains of the pre-human history of the race.

We see them best in infancy. The tendency to cling with its hands which the baby shows, and its tendency to sit and crawl near the wall or in corners and avoid the open, are neither of them of much utility now; but they were all important to the remote, unarmed anthropoid creatures who probably spent most of their life in trees, and had a score of possible enemies lurking in every dark corner. Other instincts, such as walking upright and talking are of later origin, and belong to the definitely human period of development. But in the case of the adult man instinct becomes insignificant. His intelligence has rendered them unnecessary. When we get guns we cease using bows and arrows; and when we acquire the power of adapting our actions to the rapidly changing circumstances of human life the remains of our instincts are often only a nuisance. The inclination to bite and scratch and tear is of no use to the warrior armed with sword and spear, and so the inherited ability tends to get starved and to die out. In animals of considerable intelligence and power of adaptation, indeed, we never find instinct developed in the same high degree as in the lower races. Young insects and reptiles may show their untaught ability in the first movements of their lives. Thus one observer reports how he saw little alligators, not completely hatched, rush at anything which irritated them and bite at it furiously. In the same way chickens may be observed to pick up food within a few hours of emerging from the shell. But careful observations, like those of Professor Lloyd Morgan, show

that the ability is far from complete in chickens. Look at the following account :—

"Selecting one about eighteen hours old for definite experiment, I placed before him three small pieces of white of egg, moving them about a little in front of him with a long pin to draw his attention to them. He soon pecked at one of them, and seized it at the fifth attempt, swallowing it a little awkwardly. The next he struck at the second attempt, but not fairly so that it was thrust aside. Transferring his attention, therefore, to the third piece, he seized it and swallowed it at the third attempt. An hour later I tried him again with egg and crumbs of bread. He generally struck the morsel at the second or third peck, though he sometimes failed to seize it. Once he seized and struck at the first attempt. The observations on this chick are, I think, typical. The pecking co-ordination in young chicks is fairly accurate but by no means perfect at birth."

Other experiments showed that chicks two days old betrayed no sign of fear, that (having been hatched in an incubator) they showed absolute indifference to the clucking of a hen, that they failed to discriminate between the harmless fly and the dangerous bee as articles of diet. Thus, a certain amount of experience, which presupposes some degree of intelligence, is necessary. There is a tendency to perform the acts, and to perform them adequately and easily ; but in such comparatively highly-developed animals some actual practice on the part of the individual animal is necessary as well. Not only

this. Professor Lloyd Morgan holds that education plays a part, and indeed he says: "I am inclined to regard imitation and tradition, especially in animals which live in flocks, packs, or herds, as of very great importance."

How we Acquire Control of our Movements.

Let us now reconsider in greater detail how the child acquires control over his movements. It must be remembered that we have no inherited control over our limbs. The mere *want* to get an object in its reach does not enable the baby to get it. The use of his arms and legs has to be learnt by a baby just as much as the control of any other instrument. A man may wish to bicycle, and may have a bicycle at hand to ride, but until he has learnt to use it, it is of no service in gratifying his wish. Indeed, we realize this clearly enough in regard to the legs of the child, though we are sometimes liable to forget it in the case of the arms. We do not expect a child to be able to walk until it has learned to walk, though to most of us it does seem a little odd that the same child is unable to take hold of an object which we place close to it.

Putting aside all instinctive and reflex movements, and confining ourselves to those of the purposive type, the question presents itself, how do we acquire the power of performing the right movement when a given percept or a given image is presented? To go back to Dr. Titchener's example, how does a baby come to be able to

stretch out his hand to the plate merely because he is hungry and sees food before him ?

There are a number of involuntary reflex movements and instinctive movements, not necessarily fitted for the present occasion, but liable to be aroused by the overflowing of the nervous energy brought about by the sight of food. Pleasurable emotion in the infant involves movement of arms and legs, as every nurse knows. But where unpleasant emotion is aroused, movement is also originated. Aversive movements, tending to remove the object or exclude it from sight, are at least as primitive as others. Not only do we find them instinctive in the human baby, but we find them exhibited by the simplest form of animal life. Touch one of the little lumps of living jelly called amœbæ with the point of a needle, and it shrinks; but if an edible particle comes close to it, it throws out towards it a kind of feeler, a prolongation of a portion of its own substance. On the presentation, then, of an object which causes pleasurable feeling, movements ensue.

Most of these movements will be quite useless —that is, they will not secure to the baby the possession of the food. But if one happens to carry his hand to the plate, a great wave of pleasure is caused, and this serves to increase the attention paid to the movement, and to make the baby remember it more clearly. A vivid image of the movement is therefore formed, a much more vivid image than the baby forms of the unsuccessful movements which caused no increase of pleasure. The formation of this

motor image is all-important. The tendency, then, is for this movement to be recalled, perhaps not in full consciousness, but in marginal consciousness, when the child next notices the attractive object. A link has been forged between the image of the object and the image of the movement. And there is, of course, a necessary link between the image of the movement and the movement itself. We have seen that movements leave behind them a motor image, which is a complex affair, consisting of revived sensations arising from the changes which take place in the limb moved. The more attention that is paid to the movement, the clearer and more vivid will be the motor image derived from it. The motor image and the percept of the cake on the plate are thus closely connected, so that if the latter again recur, the image of the successful movement again rises in consciousness.

We have seen just now that attention to the motor image is itself a step towards bringing the movement about. Every clear image of this sort tends to become a real movement. If we stand on an elevated place and begin to picture ourselves tumbling, we begin to tumble. This may help to account for the fact that if we see other men running to catch the train, we run although we know we are in no hurry. If other persons yawn in our company, there is a direct inclination to imitate the performance. Of course, under ordinary circumstances this tendency to turn ideal into real movements is held in check by the presence of other ideas which are incompatible. But when this is not the case, the

tendency fulfils itself. Every image has, in fact, for its physiological basis a very faint form of the same kind of excitation as the corresponding percept has. If I imagine a touch on the tip of my nose, the same kind of nervous change takes place there as if I had actually been touched there, only in a much weaker degree. If I imagine a bright light, the retina is affected in the same manner, though in a less degree, as if I actually saw the light. So when I imagine a movement, the same nerves and muscles are affected as when the actual movement takes place.

Side by side with the effect of success in fixing the image of the lucky movement, and causing its repetition, we have the effect of failure in stopping those movements which do not bring the hand of the child to the food. These will, on the whole, be less likely to be repeated than the successful ones.

With every repetition the successful movement becomes easier and more precise. The partial errors are corrected, and the child, instead of carrying his hand round in a curve, learns to carry it straight to the object. It is combined with other movements which assist to bring about the result; for instance, the child learns to lean forward or to employ his two hands together in order to get at the food more easily.

Imitation also comes into play. The child sees other people doing what he does, or is trying to do, or would like to do. This gives him a clearer picture of how the movement ought to look, and so strengthens the sight element in the motor

image. Professor Baldwin, in his observations on his own child, noticed the first imitative movements in the eighth or ninth month. Other observers have noticed them earlier, for instance, Dr. Sully in the fourth month. But these refer to movements obviously undertaken by way of mimicry. From a still earlier date the sight of others doing the same thing is probably a direct help to the child in developing movements which he has already begun to perform.

After a time the mere image of the end sought inevitably suggests the movement necessary to obtain it. It is no longer necessary to see food in order to make a movement towards it. When the hungry child thinks of food, that is when he has even an image of the food, he begins to make the necessary movements to obtain it. And in time the motor idea itself ceases to be prominent in consciousness. The child has no longer to think of the movement; he only thinks of the food. The motor image is doubtless somewhere in the margin of consciousness, but it no longer occupies his attention. We see this for ourselves in the case of learning to ride the bicycle. At first every movement has to be the object of attention. All the movements necessary to pedal, to preserve our balance, and to guide the machine are fully and painfully present to consciousness. If our attention is momentarily diverted, a disaster is inevitable. To see someone we know is enough to upset us. But after a short time most of these sensations become subconscious, and we only pay complete attention to the more important and difficult adjustments.

Later still and we are fully conscious of none of them. They all become marginal, so that pedalling, preserving our balance, and even guiding the machine, all become almost automatic. For all practical purposes this is a great gain. "This is the distinguishing feature of the good player," says a writer on athletic games. "The good player, confident in his training and practice, in the critical game trusts entirely to his impulse, and does not think out every move. The poor player, unable to trust his impulsive actions, is compelled to think carefully all the time. He thus not only loses the opportunities through his slowness in comprehending the whole situation, but, being compelled to think rapidly all the time, at critical points becomes confused; while the first-rate player, not trying to reason, but acting as impulse directs, is continually distinguishing himself, and plays the better game under the greater pressure."

Control of our Thoughts.

Somewhat in this way the child learns to control its movements. But this is not the only control which it has to exercise. It has to learn how to control its thoughts and its feelings. This later stage does not begin till a year or two after the child has learnt to use its arms and legs in a highly efficient way. What do we mean by control of thought? We have seen that left to themselves our ideas follow each other in an order which is determined by what is called *suggestion* or *association*. One image pulls another

into consciousness, without any interference on our part, and so a stream of consciousness is formed. This has been sufficiently explained above (Chapters I. and II.) and need not be again described here. But directly we begin to think about any subject seriously, especially if it be one which is not in itself particularly interesting, we find a very different state of affairs. All the wandering branches of association must be rigorously lopped off and the plain trunk only must remain. My mental condition in active thought compared to my mental condition during reverie is as a hewn log compared with the original tree, or a canal compared with a natural stream. All the time I am busy removing the constant tendency of my thoughts to wander from the central subject of interest, and trying to concentrate them on the ideas which are more or less directly suggested by the central idea itself, and are in logical relation to it. For instance, let us suppose I am trying to work out a little algebraical problem about the respective ages of a ship and her boilers. I have an inclination to visualize, that is, to have clear mental pictures, and unless I take care I am more than likely to let my attention wander in this direction ; I shall begin to picture an iron ship with her boilers being taken out of her, and then to picture a quay, a river, men standing about, and soon the conditions of the problem will have slipped from my focus of attention. These images of ships and men hovering about in the marginal field have more interest for me than those purely mathematical notions which ought to be occupying

my attention, and in the struggle which always goes on for mastery they begin to gain the day. Then perhaps the noise of the breeze, the flashes of the sunshine on the swaying leaves, the barking of a dog, the crowing of a cock, come successively before my mind and compete with the other two sets of ideas, viz., the mathematical and the visual. But I resist them all and return to my problem every time that I am disturbed. How is this? Because I have a desire to solve it. This desire may have been set up by curiosity to know the answer, or curiosity to see whether I have forgotten my algebra, vanity, because I do not want to believe that I cannot solve the problem, genuine pleasure in solving problems, or any other motive or motives. But there it is. Just as I want some object of daily use—say a hammer—I want the answer to this problem. And just as I have to set about finding the hammer, I have to set about finding this answer. In both cases the strength of the desire is the matter of chief importance. If the desire is strong, I shall at once remove my attention from images which lead me away from the steps necessary to settle the difficulty. If it is weak, I shall let my thoughts stray some distance before recalling them. *The presence of this constant interest in the same group of ideas* is one of the chief things which mark off thinking from mere association of images. I keep the terms of the problem clear before my attention, and constantly withdraw attention from all competing ideas. Other features are no doubt present too. I constantly split up or analyze the complex notions

and re-arrange the parts so that I may try to understand their relation to each other. For instance, I ask myself what does it *mean*, if we say that the age of the ship six years ago is half what it is now; what other facts are involved in this statement? I keep on attending to the relation of time, of quantity of time, and to that only. All notions disconnected with this I ruthlessly drive out of the focus of attention; while I from time to time strengthen my desire by dwelling on the importance that this particular point has for me, since until it is settled I cannot obtain the solution I desire to obtain. Voluntary attention is mainly a matter of voluntary *in*attention.

Control of our Feelings.

Besides control of thought there must be in the sane, normal man control of feeling. In the child we find neither. The course of his thoughts and the course of his feelings are alike at the mercy of every passing percept. It is only after a year or two that he learns to attend to objects which are not in themselves interesting. And it is somewhat later still that he learns to control his desires and feelings. The child, the idiot, and the lunatic are all marked by inability to control their desires, however slight. "I have known a man steal," says the well-known authority on lunacy, Dr. Clouston, "who said he had no intense longing for the article he appropriated at all—at least consciously, but his will was in abeyance, and he could not resist the ordinary desire of possession

common to all human nature." "Ask half the common drunkards you know why it is that they fall so often a prey to temptation, and they will say that most of the time they cannot tell. . . . They do not thirst for the beverage; the taste of it may even appear repugnant, and they perfectly foresee the morrow's remorse. But when they think of the liquor or see it, they find themselves preparing to drink, and do not stop themselves; and more than this they cannot say." (James.) Of course there are many instances where we must suppose that the fault does not lie wholly in want of controlling power, but partly also in the diseased strength of the impulse. As Dr. Clouston puts it, "The driver may be so weak that he cannot control well-broken horses, or the horses may be so hard-mouthed that no driver can pull them up." With the normal human being the latter condition of affairs seldom obtains. It is not a question of excess of impulse, but of lack of control. Hence the hope of improvement. The child is in the position of the weak driver; his horses, that is, his impulses and feelings, will be quite within his control if he continues to develop.

Such control comes about chiefly by means of our already acquired control of our movements and control of our thoughts. The child is taught to suppress those movements which express strong feeling, and in suppressing the movements he is not only "behaving nicely," but he is suppressing the feeling itself. We have seen in the last chapter that the emotion is in large part simply a consciousness of the bodily

changes which we call its expression. Some of those bodily changes are within our control, and so far as we inhibit them (that is suppress them) we are inhibiting the feeling itself. Thus if a child is greedy we actually diminish the greediness if we restrain the movements that express it, the hand thrust forward, the eager eye, and so on. If he is unduly jubilant we calm down the feeling by making him sit quiet. Further, we can even help to institute a new and better state of feeling by making him imitate movements appropriate to it and incompatible with the feeling which we wish to suppress. If we make the greedy boy give away something, with as good a grace as possible, or the passionate boy speak gently, we stand a better chance of success than if we merely suppress the symptoms of greediness or anger. There is, no doubt, a certain danger of hypocrisy here; but there are few useful remedies which are not dangerous in some degree and under some conditions of the patient. Another important means of control over feelings comes from our power to control our ideas. We can withdraw our attention from that which stimulates the feeling. In the case of young children this withdrawal must be accomplished for them, as they can no more resist the pressure of ideas than the pressure of feelings. If a child is in grief we must try to amuse it by presenting interesting objects to it. It is no use to say, "Don't cry," or "Cheer up." We must call the dog, or produce a new toy, or a sweetmeat, or begin to talk of some promised treat. As we get older we learn to direct our attention for ourselves from that which

arouses undesirable feelings to that which banishes them by exciting other feelings incompatible with them. We can force ourselves to remember circumstances which will mitigate our resentment against an erring brother, or turn aside our thoughts entirely to less irritating topics. The control of the feelings comes partly through control of the muscles, but still more through control of ideas.

Deliberation.

With the power of control of our thoughts and feelings comes the possibility of a higher development of will. We can postpone action until we have had time to consider all the circumstances, and see, first, whether the end sought is worth seeking; and secondly, what are the best means for attaining that end. We have then what is called *deliberation*. Habitual deliberation is possible only for the man who has learnt well the control of his impulses. The man of ardent temper, eager, impetuous, never gives himself time to think. The considerations of prudence, affection for the absent, regard for law, stand little chance; he sins and blunders, and if he is a good fellow repents. This is what Dr. James calls the "explosive will." At the other extreme, amongst persons who are not abnormal enough to be called in any sense insane, is the type which is so "sicklied o'er with the pale cast of thought" that it cannot deliberate enough; which considers, and reconsiders, and for ever puts off the moment of action. This is what Dr. James calls

the "distracted will." A little less inhibitory power, or a little more, and we have positive mental disease. The one abnormal type is violent with uncontrollable impulses towards homicide or self-injury, or he becomes a dipsomaniac or a kleptomaniac. The other abnormal type is characterized by inability to come to any decision. Here is an instance of the latter taken from Dr. Hyslop of Bethlem Hospital, London: "One patient, formerly an inmate of Bethlem, used to lament this inability to act. She was able to understand and reason upon her ordinary experiences without any observable impairment of intelligence. She was, however, unable to put into effect the result of her deliberations, and the desire to reach the circumstances proved ineffective." Such patients, left to themselves, can sometimes do nothing. "If you abandon them to themselves they pass whole days on a bed or in a chair," says another authority.

Choice and Resolution.

We see, then, that the power of deliberation must be supplanted by the power of arriving at a decision, and of making a *choice*. This is, in fact, the most central fact of will. This is what voluntary action in its higher sense really means, action not simply followed, but selected out of two or more possible courses. Selection implies rejection. If I choose to take the course A, I at the same time choose not to take the courses B and C. Consequently, where there is effective choice, the rejected alternatives must drop out

of sight. You may sometimes see a man on a railway platform running up and down till the train starts, quite unable to make up his mind as to which compartment he shall enter, although none of them are full. This is a Hamlet on a small scale. His "native hue of resolution" is "sicklied o'er with the pale cast of thought."

When a choice is made, it may involve action at a future time, and not an immediate realization. We, then, have the mental fact we call *resolution*. The resolute man is one who adheres to his choice after it has been made, in spite of the chances and changes brought about by time. He refuses to reconsider the point after it has been decided; and when the rejected courses of action, or fresh possibilities, obtrude themselves, he inhibits them, dismissing them from his focus of attention. Of course, circumstances may so change that the man who does this, and will not reconsider his decision, is a fool. Then the resolution is spoken of as obstinacy. But human nature is more often too weak than too determined; and given an average degree of intelligence and knowledge, a man is not so likely to be too firm as to be lacking in firmness. Obstinacy comes easy only to the stupid man.

Will.

What, then, is the act of will itself? It is essentially the fixing of attention on one particular object, and the acts necessary to realise it, and the withdrawal of attention from the rival object. "The essential achievement of the will,

in short, when it is most 'voluntary,' is to *attend* to a difficult object, and hold it fast before the mind" (James). You are tempted to do something which you know to be imprudent. You very much want to do it, but you have control enough over your thoughts and feelings not to allow yourself to be "rushed." You recall the evil consequences to yourself and others, and you shrink from enduring and inflicting them. But the attractive influence of the tempting object is very great, and the image of it is much more vivid and much more stimulating to immediate action than the picture of possible consequences. If you were a mere automatic machine the temptation would be too great for you; but just because you are not, you can keep your attention fixed on the vision of the evil consequences, and by so doing develop and deduce them in your mind until such a force of feeling is produced as will cause you to turn away in disgust and self-anger from that which a short time before attracted you.

Several rival conceptions of the nature of voluntary action claim our acceptance. According to one theory, there is in the act of deliberate choice something more than a purely natural event. The action of ideas and feelings does not suffice to explain what we mean by choice or decision. Another force comes into play, not determined by purely natural causation, namely, the *I-myself*, the *ego* which knows and thinks. It is just this which prevents our being elaborate pieces of conscious machinery. Will, in the strict sense of the term, just means this conscious

selection by the ego of one of the alternatives. This is the view which is taken by the average plain man. Am I not conscious, he asks, that in the act of willing I myself do actually choose? And is not this consciousness absolutely clear and decisive of the matter in hand?

The second view comes in here. Yes, say those who hold it, you are conscious of the fact that you determine your actions for yourself. But what do you mean by yourself? You mean the series of thoughts and feelings, and of tendencies to thought and feeling; the *I-myself* which you have come to know by means of observation and experience, just as you can come to know the world at large. This is what you mean by character and disposition; and this it is that determines your action. As for the other *I-myself* you talk of, that is a pure assumption, not an object of experience at all. What do you mean by an *I-myself* which never comes into consciousness at all, which cannot be known, which is not subject to the law of causation? If this *ego* is not subject to causation, then how can it be educated, how can it develop and give evidence of moral improvement? No, put aside as absurd the conception that any imaginary *I-myself* interferes in the conflict of motives and makes the final choice. The only meaning to be attached to *I-myself* is the meaning which, after all, you as a man of common sense probably do attribute to it, namely, the sum of tendencies to particular kinds of ideas and feelings; and there is no doubt that this the *real*, not the fanciful, *I-*

myself does decide which of two courses of action shall be followed.

I am not going to attempt to decide between these two statements, but I would point out that the consciousness of free choice which seems so convincing to the plain man is not quite such a strong piece of evidence as he fancies. Experiments made on hypnotic patients go to show that one may have the fullest belief that one is acting spontaneously and yet, as a matter of fact, be acting in a purely mechanical way. Professor Richet gives the following account: "One of my friends who was drowsy, but not quite asleep, carefully studied this phenomenon of incapacity to act, combined with the illusion of capacity. When I prescribed a movement, he always performed it even although he had, before he was magnetized, been determined to resist. He found this hard to understand when he awoke, and said that he certainly could have resisted, only he did not wish to do so." Another patient was hypnotized by the same distinguished psychologist, and the suggestion made that when she awoke she would take the shade off the lamp. "I awoke her, and when we had conversed a few minutes she said, 'We do not see well,' and took off the shade. Another time I said to B: 'When you awake you will put a good deal of sugar in your tea.' I awoke her, tea was served, and she filled her cup with sugar. Someone asked what she was about. 'I am putting in the sugar.' 'But you put in too much.' 'Really, that is a pity.' And she continued to put it in. Then she said, on finding the tea undrinkable: 'What

would you have? It was a stupid thing to do; but have you never done anything stupid?'"

Dr. Moll, in his book on hypnotism, gives the following account of an experiment he has repeated in various ways with different patients. He suggests a post-hypnotic act to a subject, that is, tells a subject in the trance state that when he wakes he will do a certain thing. For example, he tells him to lay an umbrella on the ground. "The subject now wakes, and I tell him to do anything he pleases; but at the same time I give him a folded paper, on which I have written what he is to do. He does what I have suggested, and is much astonished when he reads the paper afterwards. He declares that this time he was quite sure he would do something else than what I had suggested."

Of course the hypnotic state is an abnormal state, and you cannot directly argue from what occurs in the case of hypnotic subjects even after being waked to perfectly normal people who have not been hypnotized. But there is enough here to cause a doubt whether the apparent consciousness of free will is as convincing a proof of the reality of free will as we are apt to think it.

Self and Selfishness.

Psychologists have in former times given accounts of the facts of volition which entirely left out of sight the existence of a self of any kind. Thus Dr. Bain regards the mind as a mere arena for the motives to fight in. The strongest motive wins the day. There is no interference of any-

thing. The only determining circumstances are the motives themselves. "The equipoise may continue for a long time; but when the decision is actually come to, the fact and the meaning are that some consideration has risen to the mind, giving a superior energy of motive to the side that has preponderated." The objection to this view is the fact that motives derive all their strength from their relation to the self or character. The "consideration" which gives the victory to a certain motive does not rise of itself, but in consequence of the nature and previous experience of the mind. Instead of the conception of two or more opposing motives, one of which wins, and suppresses and destroys the rest, we must have the conception of a number of motives constantly varying in strength as they are attended to. A high degree of attention is accompanied by a sensation of effort, and this strengthens the consciousness of self.

Remember that all purposive action is not *selfish* merely because it is all the outcome of a self. All your actions are the outcome of your present self; but they are not all intended to procure selfish ends. You may as well say that all your ideas are about yourself, because they are all *your* ideas, determined by the nature of your own mind, and by its contents. Among your own desires and determinations two great groups can be distinguished. One has for its immediate and direct object the increase of your own happiness; the other has not. You may determine to do a certain thing because it will add to your own happiness, on the one hand; or

on the other, because it will add to the happiness of someone else, or advance some cause or ideal in which you are interested. "Ah," you say, "that is where the *self* comes in! I must be interested in it, that is, I must know that if it succeeds it will give me pleasure, and if it fails it will give me pain." Quite true. But there is all the difference in the world between desiring what will give you pleasure simply because it gives you pleasure, and desiring what will give you pleasure because you have recognised that it belongs to a particular group of things which you believe to be right and good for everybody. You cannot get rid of self any more than you can jump outside of your own skin. Your thoughts and hopes are your own, or you would be unaware of them. But whereas some of those thoughts and hopes have self for an object, others have something else. The attainment of any aim, the fulfilment of any desire, gives satisfaction, because the painful state of desire then ceases. But the desire may be for something in itself painful. "How am I straitened till it be accomplished!" says our great Master, referring to His own sufferings and death. The martyr and the hero do not go to pain and death on account of the future pleasure they look forward to, or the pain and contempt they wish to avoid. There have indeed been non-Christian martyrs who hoped for no future life, and who went to death only because they loved what they believed to be the truth, and hated what they believed to be a lie.

CHAPTER VIII

THOUGHT AND LANGUAGE

In Chapter II. we talked of the formation and revival of images—that is, mental representations or pictures (if we may so stretch the word "pictures")—of objects perceived by the senses. For simplicity's sake let us at present confine ourselves to visual images, or revived percepts of sight.

Let the reader try to recall the appearance of someone whom he has seen many times, though not within the last few minutes. This mental image is clearly not simply the reproduction of the last view we have had of the person, it is a result of all our various acts of perception blended together. It is curious how often we find that the *first* look we get at a person is different from the view we afterwards take. Persons keen in observation have told me that they nearly always feel a slight shock of surprise on returning home to their wife and children after an absence of a month or two. The new percept is distinctly not quite the same as the image which had been formed by many thousands of separate acts of vision. In the image they took away with them much was overlooked; changes of feature of the last few months had not made a deep impression, because the lines of the old image were so much more familiar. That the wife's hair has a few grey threads in it, and that the baby's is more brown than golden; that the matronly wrinkles

are beginning to show a little, and that baby is really not so bad looking, all this may escape notice at ordinary times, and yet be sharply impressed on us on our return after a longer absence than usual. A photograph, in the same way, usually differs from our mental picture of a person. The camera only looks once, and from one point of view, and we have been looking scores or even thousands of times from many points of view—when the person is smiling, when he is cross, when he is well, and when he is out of sorts.

Composite Portraits.

As is well known, Mr. Francis Galton, the cousin of Charles Darwin, has produced what he calls *composite portraits*, but printing off a number of plates, each exposed for a very short period, one on the top of another. He makes arrangements so that they are of the same size, and so that they fall exactly on the top of one another; the centre of the eyes, for instance, must be strictly in the same place. Such a composite portrait would more nearly represent our mental image than any single photograph. Mr. Galton has carried the process further, and taken portraits of different individuals of the same type, in order to get not a portrait of any one of them, but a portrait of the *typical* individual. The special peculiarities of each tend to become obliterated. In proportion as a feature is typical it stands a better chance of appearing in the portrait. What appears in *all* the individuals

will be most strongly emphasized. Thus we get composite portraits of the typical murderer, the typical idiot, the typical soldier, the typical Jew, in which the general features common to all come out clearly, while the features peculiar to each are blurred and suppressed.

Now, we know that something of the same sort must go on when we form a general picture. My mental picture of a sailor or a stockbroker is produced somewhat in the same way. "A composite portrait," as Mr. Galton says, "represents the picture that could rise before the mind's eye of an individual who had the gift of pictorial imagination in an excellent degree."

When a child begins his observations he sees many individual dogs, and he gradually forms an image which resembles no single dog exactly, but which will serve for all dogs. It is a generic image. It will not coincide exactly with what we should get by taking a composite portrait of a dog, because the mind is always biassed and the camera is not. The mind is always selective. What interests one of us does not interest another; what claims the attention of the dog fancier or the policeman is not the same feature as that which claims the interest of the child. The policeman looks at the muzzle, and the child usually at the other extremity, where he knows the chief organ for expressing emotion is to be found. This does not show that the camera gives a more valuable result; but it gives one just in proportion to the numbers. The effect produced by facts of perception is not exactly in proportion to the number of times a given feature is found.

A very striking feature seen two or three times may produce more impression than a less remarkable feature seen a hundred times.

When objects differ very much no composite portrait can be obtained. It is no use to try and get a composite portrait of a snake and an elephant. And what is true of an extreme case like this is partially true of less extreme cases. Where the class is too general, or where the visible appearance of members of the class vary greatly, the portrait becomes only a very rough diagram. When we have seen many soldiers in different uniforms we cease to try and picture a soldier in general. To a man who knows dogs the idea of a generic image of a dog seems equally absurd. A very imperfect and partial diagram is our nearest approach. If we try to visualize (imagine) completely and fully, we find that we are filling in details, and getting the picture of a particular variety of dog, a fox-terrier, a pug, or a water-spaniel, and not a picture of a dog in general. Let the reader try to visualize a triangle in general, not isosceles, not equilateral, and not scalene; that is, not belonging to the particular sort having two equal sides, or having three equal sides, or having no equal sides, but triangle simply. Of course, it is impossible. You might just as well try to *draw* a triangle which belongs to none of the three sorts. You can only begin to picture it and get a half-constructed diagram, which cannot be completed without belonging to one of the three kinds. We cannot then get a generic image of every sort of object; but we may just begin to

construct a generic image, and then stop, regarding it for our purposes as a sufficient representation, though incomplete. Or we may picture an individual specimen more fully, so as to get all the details of it, while we know that it is not a representative of the class but only of some small part of the class. Thus I can construct either an imperfect image of a dog, just a rough, incomplete thing with perhaps the head of a retriever, but everything else quite uncertain; or a fully-developed portrait of a favourite fox-terrier.

Some persons, as we have seen (Chap III.), have the power of visualizing in a very high degree; others in a very low one. The work done by visual images in one man is done by motor or auditory images in another. Indeed, there need be no image of the thing we think about at all; an image of the word by which we call it will suffice.

Conceptual Symbols.

An inquiry conducted by Professor Ribot, and since justified by later workers, shows that people may be classed in several different groups, according to the way in which they think. There are persons who always have a visual picture in their minds, whether complete or incomplete; either a fully-developed visual image of the thing thought about or a partially-developed and diagramatic one. Such persons belong to what is called the *visual-concrete* type. A more limited group have a *motor-concrete* image, in which the image of the

thing is not mainly visual (though there may be visual elements) but is made up of muscular feeling and other sensations aroused by movement. To this group must belong such of the blind as belong to the concrete type of thinkers. I have heard of a very great living painter who before painting a figure finds it necessary to model it in clay; after which he can paint it. He does not employ a living model, for his clay statue; but whereas he could not paint from his visual imagination of the figure, he can mould a solid figure for his motor *plus* visual imagination. To one or other of the concrete types (principally the visual) the great majority of people belong. Others belong to what Ribot calls the *visual typographic* group, who see a visual image of the printed word; such are the persons mentioned by Galton, who "see mentally in print every word that is uttered."

Others, met with less frequently, have before the mind only the spoken word, which as we shall see is something more than a revived sensation of hearing. This last is called by Ribot the *auditory-motor* type of mind. It seems, however, that most persons, whether realizing it or not, form some sort of concrete visual image where this is possible. Experiments conducted on hypnotic patients point to this conclusion. Such experiments undoubtedly reveal what is going on in the subconscious region of the mind; that stratum of thought and feeling which ordinarily cannot be brought clearly before the attention. It is found that persons who, when in their normal state, deny that they have any image before their

minds, when questioned in the hypnotic trance describe themselves as having it.

There is no reason to think that these types of concrete, typographic, and auditory-motor thinking are always found in different persons. The same person may sometimes have one sort of idea before his mind and sometimes another. Thus Professor Sidgwick of Cambridge found that while he employed only the visual image of the printed word in logical or mathematical reasoning, he employed a visual image beside the image of the word when he was thinking out problems belonging to the science of Political Economy. But these images were often curiously arbitrary and sometimes purely symbolic. After much consideration he discovered that "an odd symbolic image which accompanied the word 'value' was a faint, partial image of a man putting something in a scale."

And we must not overlook the fact that some kinds of thinking must be conducted with very little aid from concrete images. Thus it is difficult to see how we can form concrete pictures answering to, let us say, legal disqualification, or inverse ratio. Personally, I imagine the printed word only; but some person may have a symbolic visual image, such as that which answers to Dr. Sidgwick's use of the word "value." In the case of "woman's franchise," I confess to a faint (and unflattering) picture of a woman which must have originally come out of a comic paper.

Concepts and Images.

There is an enormous difference between the image, whatever it is, and the notion or concept. My notion of a dog is not at all the same thing as my mental image of a dog. In what does it differ? It differs in this way. The image does not imply any knowledge beyond itself. It is what it is and nothing more. The concept has an image (concrete picture, printed word, or uttered word) as its core, but it is a great deal more than this. Round the core hang much more vaguely represented facts, which we know to be implied, but which we do not attempt to picture now, and many of which cannot be pictured at all. *In the concept the image* (whether of the thing or the word) *is only a symbol.* The essential meaning of dog is not what I picture, otherwise one of those elaborate painted earthenware dogs would be a dog. It is just the facts that we put into what we call the definition of "dog"; the fact that it is an animal of a certain kind, closely allied to certain other kinds of animals (wolves, foxes, etc.), that it has a certain general size, shape, anatomical development, mode of life, and so forth. It is all these things which make up what is ordinarily called the definition or connotation of the term "dog," and it is these things that are the really important part of the notion. With just the same mental image before us the connotation may change. The naturalist means by dog so much more than the child does. Even if the naturalist and the

child have the same mental picture aroused they have very different concepts. It is the knowledge that the dog is of the same family as wolves and foxes, sharing with them all the family qualities that mark them off from the other carnivorous animals, as well as those which connect them with the other carnivores; it is the recognition of the relations of likeness and unlikeness connecting dogs with all other classes of things in the world. The child knows only a very few of them, and those not the most important. He sees that the big dog is rather like a bear, and he is right as far as he goes; but it is not very far. The anatomical likeness and the anatomical unlikeness he knows nothing of; he has only a very general and inaccurate knowledge that in external appearance the retriever and a small black bear are somewhat similar. He knows next to nothing about the mode of life of dogs in general, though he may know something about this dog in particular. He does not realize that the dog has a set of well-marked mental and physical qualities, that it once lived in a wild state, and that the domesticated variety has many special qualities of its own.

Thinking.

Now it is the knowledge of these relations which constitute the chief difference in my state of mind when I think about a dog from my state of mind when I only picture a dog. When I think I use the image (whether concrete, or typographic, or auditory motor) as a symbol to hold in con-

sciousness in order that I may not forget the relations. Round the more or less clearly defined image is a "fringe," as James calls it, of imperfectly realized facts, some of which might be brought into full consciousness, while others are quite incapable of it. Without these it is a mere image, and means very little. With them it is the foundation of a thought, which may mean a great deal. Notice, we do not keep the image in the full focus of attention while we think about it, but we keep it at hand in the field lying round the focus of attention, capable at any instant of entering it. If the image were the thing chiefly attended to we should not be able to *think*. Persons who visualize well, that is, children, young people generally, and persons of artistic nature, are inclined to do this. The image aroused is nearly always, with them, a concrete one—the picture of a thing, and this is so interesting that they cannot take their mental eye from it. All the *relations* lie forgotten and neglected. And in the mind's grasp of the relations consists what we call thought, as opposed to imagination. If they are not apprehended we are not thinking. We sometimes use the word "think" when we mean "remember"; we say, "I cannot think of that number," when we mean "I cannot remember that number." But this is not the proper use of it. The thinker, the thoughtful person, is not the person who merely remembers or merely pictures; indeed, some of the least thoughtful people have very creditable memories. He is the person who grasps the relations which connect the objects which occupy

his mind with other objects. He understands, or tries to understand, the various ways in which they resemble one another and differ from one another; how they are connected in regard to time and space; how they are caused, and what effects they produce. All thoughtful persons will not fix their attention on the same relations of a thing, but they will fix their attention on some of its relations. Thus suppose steam is mentioned. One man, say a student of science, begins to consider its relations to water and ice, to clouds, rain, and other meteorological facts. Another man, an engineer, considers its value as a motive force in machinery, and instead of thinking of ice, clouds, and so on, begins to think of other forms of heat-engines, and of appliances for preventing waste of energy. A third, a medical man, thinks of steam as cause of scalds. A fourth, a student of social science, begins to think of the changes produced in the nineteenth century by the application of steam to manufacture and locomotion. An artistic person may content himself with visualizing the beautiful effect of clouds of steam emitted by engines in bright sunshine. If so, he will not be thinking at all, but merely imagining. The others have been employing representations only as a help to bring before their minds the relations of steam to many other things. The artist remains completely interested in the visual picture. They keep looking at the object from all sorts of points of consideration; he only from the one side—its external appearance. They therefore constantly split up or analyze the object of thought, and

look at each part or element in abstraction, then put them together again. The engineer neglects the relation of steam to ice and cloud, but analyzes its relation to heat, its conductivity, and so on. The sociologist forgets all about ice, water, cloud, heat, energy, scalds, beauty, and so forth, and confines himself to the commercial, industrial, political, and military changes brought about. But he keeps analyzing, asking himself how and why such effects are produced. "Is the bettering of the state of the working classes due to steam? Is the effective growth of democracy due to steam? Perhaps it may be. The possibility of every man taking an intelligent interest in the government of his country is dependent on rapidity and cheapness of communication. If it were not for the steam press and steam locomotive the cheap newspaper could never have existed. Therefore . . ." And so he goes on analyzing the great mass of considerations we call "the condition of society," and separating one fact from another brings each one into some kind of relation with the steam engine.

At every step he keeps comparing with other aspects the facts or aspects he has isolated. The recognition of a likeness or unlikeness is in every case the consequence of an act of comparison, sometimes made consciously and voluntarily, sometimes automatically making itself as it were.

All this requires constant effort of mind. Each moment fresh ideas come before the attention, chiefly by the action of what we call suggestion or association. But these ideas are so many

rivals for our attention, and each tries to monopolize the whole of it. If the philosopher lets his mind run exclusively on political considerations, he will find that not only has he overlooked industrial and commercial ones, but that he has forgotten all about steam in its relation to society, and is thinking only of political considerations in general. At every moment the mind of the thinker, dominated by the central notion of the steam engine in relation to social progress, keeps cutting off the attention from these diverging and misleading tracts of associated ideas. He must keep to his subject, so he refuses to be led astray into by-paths, however fascinating. This is what we saw in Chapter VIII. in speaking of the control of our thoughts. The act of thought implies a constant struggle to suppress intruding percepts and seducing images. It is a position of unstable equilibrium, like balancing an egg on its end. The sunshine, the voices of our friends, the hundred sights and sounds that call us back to the world of sense, on the one hand; the divergent trains of images roused up within us, many of them more interesting than the ruling idea, on the other; these are the Scylla and Charybdis which threaten wreck and ruin to our bark of thought.

Language and Thought.

Fortunately, we have a great help in language, which fixes our thoughts and helps us to retain them in a tolerably definite form. We never find anything that can properly be called thought

without language. In the growth of a child's mind we have a good opportunity of verifying this, and careful study of the lower animals also confirms it. Many people, of course, hold that at any rate their own pet dog or cat reasons. But those who send extraordinary stories about animals to the newspapers are seldom very exact observers, and the evidence on which they rely to prove that their four-footed friends so reason is, no doubt, often exaggerated, while it is usually susceptible of a much less startling explanation. Thus Professor Lloyd Morgan, who knows more about the subject at first hand than any other living man, says that while he is not prepared to say that animals never do reason, he thinks it very improbable. "The fuller and more careful the investigation, the less is the satisfactory evidence of processes of reasoning."

Language is a system of signs, of ideas, and of relations between ideas. These signs may be spoken sounds, as in ordinary speech, or purely visual, or as the Egyptian hieroglyphs are to a modern student, or constructions of movement, as in the finger language used by deaf-mutes. Most of these signs are acquired by constant use; they have, as a rule, no powers of suggesting the meaning, but the meaning and the name get linked together by dint of constant repetition. There is no real reason why *dog*, or *hund*, or *chien*, or *canis*, or κύων, should represent what is called by these words, rather anything else. The link between name and thing is, in the strict sense of the term, an arbitrary one, though, of course, it is not a matter of chance whether a French boy

will eall a dog *chien* or use one of the other words. As long as everybody will all agree to use it in a given sense, one word will do as well as another. How a word comes to be formed and used in a eertain sense may be a very interesting story; but this does not alter the fact that another sound would do just as well, if you could only get everybody to aecept it. Any other device on a bank-note would serve just as well as that which the Bank of England puts on it, if only this were agreed to by the bank and publie alike. Fresh names are always eoming into use owing to the ingenuity of diseoverers, the perversity of those who love slang, and other eauses. The child sometimes invents them for itself, or gets them invented for it by the nurse.

A spoken word onee formed is, it must be remembered, a rather elaborate affair. Our perception of it is not due simply to the ear. It no doubt reaches us through the ear, but the sound revives other sensations besides auditory ones. When a word is heard or remembered a motor image is aroused, a faint revival of the sensations arising from the movements of the voeal organs by which the word is uttered. The larynx is a most eomplicated musical instrument governed by seven sets of muscles, and by these sounds of various pitch are produeed. These sounds are modified in their passage through the pharynx and mouth, and thus we get the vowels. The consonants are produced by the movements of lips, teeth, tongue, and other ehanges in the cavity of the mouth, all brought about by muscular tensions. There are other sounds produced

by means of the nose, but there is no need to describe the movements in detail. All these movements leave a trace, and this faint image is revived, incompletely doubtless as well as faintly, when we hear the name or even think of it.

That these motor elements are included is proved by the way in which people move their lips in thinking. They talk to themselves or think aloud. This is more common in children than in adults, and among uneducated and stupid people than among the cultivated and thoughtful. But when a subject of great difficulty is under consideration, men of great intelligence who at no other time use actual movements occasionally do so. The tendency is there all the time; but with the assistance of the images of printed words, and the greater experience and ability in the wielding of verbal language, there is in ordinary cases no need for the additional clearness that comes from actual articulation. The philosopher and man of science has the inclination to articulate, and if he is given to introspection he can detect the suppressed sensations.

When the baby learns to associate a given word, say "puss," with a given object, the process is rather more complicated than it looks. He has to link the sound with the motor-sensations of which I have just been speaking; and he has to associate the two (as a whole) with the percept of the cat. A little later he learns to extend the name to other cats; this is not so difficult as it seems, because he probably does not recognise the differences as easily as the resemblances. Agreement in colour, general shape, and general

size go a great way in making him identify other animals with "puss." Young children will call a rabbit puss; as indeed sportsmen do a hare, though *they* know better. And sheep and even fawns are sometimes called dogs by cockney children on their first introduction to them By applying the same word "puss" to various cats, and learning not to apply it to other animals, he gradually comes to link the word and the percept of the creature very closely, and the sound of the word will bring up the image of the animal if the reality be absent from the room. As he observes the cat in its daily movements, and hears stories about it, he passes from the percept to the concept. He gets a notion of cats in general, which contains other elements than those of direct sight and touch. "Puss" means a living creature which likes milk, eats mice and birds, and has a habit of sleeping in front of the fire; a creature like a dog in some respects, but one which is less companionable, and has uncommonly sharp claws.

The use of Words in Thinking.

Now, what exactly is the service rendered us by the use of names? In the first place if any one uses it, it enables us to revive the image, or the notion, of the thing named. In the next place it enables us to raise the same idea in the minds of other people. In the third place it enables us to think about the object much more easily than we could do otherwise. It does this by holding together the group of images and

notions which form the meaning, or as logicians call it, the connotation of the name. We know that all the attributes a, b, c, d, e, f, and so on, are implied by the name N; and even if some of them are not in the full focus of attention the use of the name pulls the others into the field of consciousness ready to come into full focus on the slightest provocation. Until a thing has a name we are much more likely to overlook some of its attributes. The name clamps the whole and gives the thing an individuality. It is something like learning the name of a person. If you are told a man's name and get clearly a hold of it, you are much more likely to know him, and remember who and what he is, than if you can only remember him as the "tall man with grey whiskers that I met last year at Brighton." You can certainly communicate your opinions of him much more easily than if you have to allude to him in this round-about way. You may have a very poor mental picture of him and know very little about him, but the name makes up for the indefiniteness. So it is with general names. Suppose that it was impossible to give names to newly-discovered natural objects or natural forces, how much harder it would be for astronomers to think about a given star if they had to remember it as the heavenly body discovered by Professor Jones in 1868; or for physicists to think about a given substance as the body formed by the combination of two atoms of such and such an element with three atoms of some other. How could anatomists and physiologists ever know exactly the structure of the body if they were

unable to fix the shape and position of every minute muscle and gland by a name? And when we come to highly abstract ideas, which are not the names of things at all but of complex relations of things, the case is still clearer. No definite thought about the origin of species would be possible if we could not link together comparatively firm and unchanging groups of facts and relations under such names as "variation," "heredity," "natural selection." In the same way modern physics would be impossible without such words as "undulation," "ether," "polarization." Imagine yourself trying to explain the principles of free government without such words as "representative," "constituents," "constitutional." Such words enable us to fix our attention on certain important facts and relations (important for the purpose in hand) and neglect others. "The word is the symbol that enables us to hold together in a coherent system, though not in a single image, the relations which make up the contents of our thought." (Bosanquet.) And we are able to wield the whole set of relations just as easily as if we had to deal with one single relation. Some of my readers may remember how, after a mathematical operation has been performed which gives us a big, involved expression, we may substitute a single letter for all this, and use this letter just as easily as if it meant something quite short and simple. Words are used something like this; only there is one important difference. We use the algebraical expression almost mechanically, as a kind of counter. We do not attempt to realize what x and y mean in working out a

problem; we multiply and divide and transpose without any reference to the meaning. But in non-mathematical thought, which deals with more complicated relations than that of quantity, we cannot neglect the meaning in this way. When we use a word it is for the purpose of bringing the meaning clearly before us. It does this almost as well as an actual sight of the object, where it is possible to see the object at all. When the object of thought is simply a great mass of relations which can be understood but not seen or felt or otherwise perceived, the word does what nothing else can. The group of attributes and relations even in the simplest concept is too large to come into the focus of attention. The word is easily remembered and retained in consciousness; more easily than anything else except the concrete image. It is also easily linked with other words, so as to form a series or train, and in this way express fresh relations. We remember a set of words much more easily than a group of relations. A verbal rule is much more easily got into the head than a group of facts. Besides this, the meaning and the word are more closely associated than most other ideas. We have seen that in perception, when part of an object is perceived the rest is almost inevitably suggested as really and actually present. If I catch sight of a man's head looking over the fence, I never have the faintest shadow of doubt or hesitation in at once assuming the rest of the body is there too. If I see the outside of an orange there is the same feeling of absolute certainty that there will be the usual inside.

One or two elements of the percept irresistibly pull the rest into consciousness. With ordinary memory of ideas this is not the case. If I only *image* a man's head the next idea may be almost anything; there is no such close and necessary link as between the group of sensations which make up a percept. But the link between word and meaning, though not so close and strong as that between the elements of the percept, is a great deal closer and stronger than that between two ordinary images in memory. The word-image, owing to the recalled motor sensations which form part of it, is a particularly vivid form of image, very nearly approaching a true percept. It is always hovering on the brink of perception, The slightest addition to the strength of the nervous currents which accompany it would turn the image into a percept; and as we see in children and persons with insufficient control of muscles this is constantly happening, the word-image becomes an uttered word, that is, they "talk to themselves."

Thinking is something more than the manipulation of signs—that is, words. But the words afford great assistance to a process, and we could not get very far without them. The work done by language in thought has been compared to that done by the arch in tunnelling through soft soil. You cannot make a tunnel by simply building an arch; the actual excavation is done in front of the arch, but directly a few inches have been cut away, a brickwork arch is constructed to secure what has been done, and make a further advance possible. The arch is a

necessary condition of success; but after all, the real work is done a little in advance of it. In the same way the thinking involves operations beyond and beside those which can be performed by using words. The connotation (meaning) of every word is supposed to be fixed. You and I and everybody else are supposed to use every word in the same sense. We do not as a matter of fact, and when we get into earnest theological or political discussion we find this out. "After all," says Locke, "the provision of words is so scanty in respect of that infinite variety of thought, that men, wanting terms to suit their precise notions, will, notwithstanding their utmost caution, be forced often to use the same word in somewhat different senses." And most of us do not use our "utmost caution," or indeed any caution at all, in the matter. We use terms like "Protestant" and "Catholic," "spiritual" and "material," "freedom" and "tyranny," "right," and "duty," as if no uncertainty whatever attached to them; whereas all thoughtful man know that every one of these words is highly ambiguous. Our first effort must be to try and see what we mean ourselves by such equivocal terms; the next, to see what our opponent means by them. What sign we use does not matter so much as the meaning we attach to it. "Words," says Bacon, "are the tokens current and accepted for conceits [that is, ideas], as moneys are for values." We have got to make sure that we and the other party to the bargain are agreed as to the value to be attached to each.

But discussion, if it is worth anything, will

cause us to alter our meanings more or less. We are obliged to assume that the value of each word is fixed and is ascertainable; but as a matter of fact this is seldom quite true. It is the business of the careful thinker to make himself aware of the changes which occur in the meaning of words. These gradual changes indicate change of opinion, fresh results arrived at through thinking.

The question may be naturally raised, Can we think at all without language? In a sense, yes. The proceedings of the successful chess-player and the card-player, for instance, involve a good deal of thought, and this thought is conducted with very little language. It is said that patients who have lost all memory for language (*aphasia*) can yet succeed at chess and cards. But games of this kind require chiefly exact imagination of the possibilities still open; you must remember what cards have been already played, and by whom, and what cards therefore remain to be played. It may be a question of visual memory simply, to merely keep before our minds how the cards are distributed. Directly we try to make these relations of space and time clear to other people we want a whole set of special words. Suppose we take the rule in Clay's well-known manual on whist, "With a tierce to a king in any suit, it is only right to commence with the knave when you hold at least five of a suit." To convey this general caution without words would be impossible. But the player might easily observe it in every case without ever *thinking* it, just as a man can find his way from the station to the office, and yet perhaps be unable to give directions for

anyone else to make the same journey. A set of mere space or time relations then can be remembered, and new relations even deduced from them without language. "A chess-player," as Professor Stout says, "need not in actual play think about the general laws of the game, or about general maxims derived from previous experience." So far as the highest of the lower animals give evidence of thought, it must be thought of this kind. Of course we cannot expect to find them advancing very far along the road. The intellect of man has for ages been exercised and stimulated by the use of language.

Judgments and Concepts.

In books on Logic you will have learned that every judgment consists of three essential parts, a subject, a predicate, and the copula, which is really only a symbol of assertion—that is, of affirmation or denial. And for logical purposes this is so. When we want to look at a judgment with a view to see what can be inferred from it, or from what it can be inferred, the analysis into subject, predicate, and copula is quite satisfactory. When, however, we want to see in what form a judgment actually exists in the mind, we shall not rest satisfied with the form familiar to us in the Logic books. In point of fact there is no essential difference between the judgment and the concept. Every concept is an implicit judgment; every judgment is a concept expanded or rendered in some respects more explicit.

Probably the simplest form of judgment is the

impersonal. "It rains," "It snows." This is only an assertion that such or such a predicate is applicable, but it does not say to what subject. There is only one concept—the predicate. Impersonal verbs are often found abundantly in early stages of languages, and get dropped in the later stages. The demands of Logic and the analogy of other verbs gradually get rid of the anomalous impersonal verb.

It matters very little whether we form a concept or a judgment. The difference between them is not essential. Let us take the concept of (say) *orange*, embracing the well-known qualities, shape, colour, weight, softness, odour, and so on, and the less obvious qualities, good for food, thirst-quenching fruit of a tree belonging to the same type as the lemon and citron. Roughly speaking, these together form the essential attributes of an orange, and we should hesitate to apply the name to a specimen in which one of them was replaced by a totally different quality. Suppose we take one of these attributes, and, while distinguishing it from the rest, yet assert it of the whole, we have a judgment. A judgment implies some degree of disconnection between the attribute and the whole to which we admit that it belongs. We make a partial mental analysis, and then assert that one of the elements we have discovered belongs to the whole. Thus in the judgments, "The orange is round," "The orange contains juice," we at once disconnect and reunite one element of the total idea—the concept orange. In the mind, however, they are held together as a whole. The propositional

shape, with subject and predicate, while valuable in order to call our attention to just what is capable of being doubted in the synthesis, does not represent something essentially different, but an essentially similar mental process to the concept or percept.

In all thinking we have assimilation, or apperception, as the Herbartians prefer to call it. In every case new ideas, or relatively new ideas, are incorporated into one system with other ideas. Sometimes an idea is capable of being absorbed into several such systems, and actually comes to form part of several. Thus *salt* is connected with the group of thoughts about eating (meals), with a chemical group (chloride of sodium), and with a literary group (merum sal, Attic salt). It is capable of forming part of all these; and though they are rival claimants for it, we are not conscious of any impossibility of its belonging to them all. We cannot think of salt in all three sets of relations at the same moment, but we can in successive moments. We can assent to its being compatible with all of them. Some groups, however, are incompatible. Thus salt cannot, under exactly the same conditions, both be wholesome for me and unwholesome; it cannot both be a chemical element and a chemical compound. If an idea cannot be taken up by and assimilated with both of two incompatible systems of ideas, a state of mental conflict ensues which is always painful. Here we have inability to decide, our judgment is paralysed, and we have what we call a state of doubt. Most of us shrink from it with intense dislike. The plain man,

uninterested in remote ideals, but desirous of getting on well and comfortably in the practical business of life, avoids it almost as much as the religious devotee who fears that doubt involves damnation. The philosopher and the man of science know that such phases of hesitation and uncertainty, however unpleasant, have to be faced if our thought is to be real.

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